# CALIFORNIA

Digital Land Records Information
Status, Needs and Implementation Options

June 2004

Prepared for

California Mapping Coordinating Committee

Prepared by

PSOMAS

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Project Reference

This report was prepared for the California Mapping Cooridinating Committee
under contract delegation number 154, CMAS 3-01-70-1451A,
Agency Order Number CDF01241 between
the California Department of Forestry and Fire Protection, 1300 U Street, Sacramento, CA
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1. Executive Summary

Land information is vital to the operation of all segments of our society fueling
economic development, land planning and management, infrastructure management,
public safety, and homeland security. Government and private businesses require
and use land information daily to conduct their business activities but often must rely
on inadequate information because public agencies are not coordinating strategies.
Other states have made great progress in advancing the effective use of land
information through coordinated efforts that leverage existing multi-level government
resources and planned investments.

Land information is used to manage business transactions, locate where services
are provided, identify human and natural resources, and provide government
services. Underscoring the importance of land information is its almost ubiquitous
use as a location index for 80%-90% of government activities. Street addresses and
land parcels are used as a means of referencing public and private assets, services,
and managing business transactions.

Modern information technology known as geographic information systems (GIS)
combines computer mapping and databases to provide effective access and use of
land information. Many counties and cities in California, as well as other states,
have established comprehensive programs to provide on-line access to land records
information within their organizations and to the public. Most state agencies in
California, however, do not have effective access to needed land information, thus
significantly impeding the performance of their duties.

This report presents a summary of state land information needs and four options for
fulfilling the needs with different investment levels. The options present innovative
means for fulfilling State needs through collaboration with local, regional, and federal
agencies. Private sector businesses are also considered in one alternative that
would leverage existing and emerging information provider networks. Development
costs of the options range from $0.3 M to $10.5M with annual recurring costs of
$125,000 to $395,000.

Resolving the existing land information problems is of critical importance to the State
because the lack of access to current, accurate, and useable information impedes
the business activities of nearly all State programs. Moreover, failure to coordinate
land information management from a statewide perspective will exacerbate the
problem as local agencies continue to invest in land information solutions without

consideration to nascent statewide standards that enable broader information use and greater value.

Implementing a statewide land information program will result in better information access supporting the State's business operations. Each implementation option presented within this report will improve accessibility for the State, thus enhancing the effectiveness of State programs. With the more comprehensive options, beneficiaries of a coordinated statewide Land Information system would include all levels of government, private enterprise, and property owners. Public and private business activities that will be enhanced are very broad including property tax administration, real estate transactions, property management, environmental management, public safety operations, land use planning, infrastructure planning and management, disaster response and recovery, and resource planning and management.

2. Existing Land Records Environment Within State Government

The current land record information environment throughout State government is represented by many different information management approaches. This is due, in part, to the lack of a statewide strategy for organizing and managing land record information. In the absence of a statewide strategy, programs have been forced to develop their own methods of using, maintaining and gathering data to support their core business functions.

Many State programs have developed the means to utilize Digital Land Records Information (DLRI). However, some still rely on paper methods of data collection and analysis. Programs that access DLRI from other sources or maintain their own DLRI do so in various formats, standards and levels of accuracy. Similar data is often gathered and maintained by multiple programs in various forms and is often inconsistent, inaccurate and/or incomplete causing inefficiencies in work processes. This problem is exacerbated when projects require coordination from multiple agencies (state, federal, local) that reference conflicting representations of land records information.

The existing land records information environment reflects an "as needed" adoption of various information technology solutions focused on individual application needs, as well as a reliance on paper based information management. No comprehensive statewide plan exists for addressing technology adoption, standards, or systems integration. The result is redundant, costly efforts to acquire, share or develop information separately. In many cases, needs for this information are unmet.

The following summarizes the major findings and issues of the study as they relate to the current environment of the programs interviewed.

- High dependence on land record information
- Redundant land record management efforts among programs result in inconsistent, inaccurate and/or incomplete data
- Lack of statewide vision and strategy for land record information management
- Multiple, different land information management approaches
- Multiple hardcopy and digital formats used to collect and store land record information
- Varying standards and levels of accuracy

- An unmet need for DLRI within many programs, where lack of access to a standardized source leads to inefficiencies and limitations on program effectiveness

This study indicates that the current business environment has a high dependency on land record information to support the operations of many programs. Examples include:

- The California State Board of Equalization (BOE) requires updated parcel information from individual counties to support its responsibility for determining Tax Rate Areas (TRAs) and preparing Tax Rate Area Maps.

- The California Department of Transportation (CalTrans) uses parcel information primarily for land acquisition analysis.

- The Central Coast Regional Water Quality Control Board uses parcel information for many business activities including the development of Total Maximum Daily Loads (TMDL), production of notification lists and permit tracking.

- The Department of Housing and Community Development, Housing Policy Division uses parcel information to review the local general plans, especially the housing plan elements, to satisfy its responsibility for verifying the local community development plans for their positive relation to various socio-economic elements, such as population density, income level, housing affordability, job market and transportation resources.

- The California Office of Emergency Services relies on land information for emergency planning, disaster response and recovery activities.

In addition, there are numerous business processes within various programs that could be enhanced or made more efficient if standardized DLRI were available. Through the needs assessment process, one hundred fifteen (115) business functions[1] that use land records information were identified within forty-five (45) business units. Of the 115 business functions, 46 are mandated programs.

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[1] Appendix B: California DLRI Requirements and Findings

The 115 specific business functions have been categorized into basic DLRI business functions that will help to identify opportunities to present common solutions to agencies with similar needs.

- *Mapping and Analysis –* Agencies use land records to produce maps for analysis and presentation purposes.

- *Property Analysis –* Agencies analyze land records to determine optimal land use, resource allocation, tax assessment and risk assessment.

- *Data Collection and Management –* Agencies gather, manage and store land information from internal sources, private firms, or through negotiations with data owners.

- *Ownership Transfer –* Agencies track legal changes and ownership transfers for state, federal and other land.

- *Address Locating –* Use of a property address to identify the geographic location and link to property records and other attributes. This process also supports distribution analysis of multiple address locations.

- *Property Management –* Agencies perform administrative and operational oversight and management of property under their jurisdiction.

- *Permitting and Licensing –* Land records are used for determining conditions of use, issuing and managing permit and licensing activities including leases.

- *Administrative Area Determination –* Administrative boundaries such as jurisdiction limits, special districts, and agency service areas are delineated on property maps to help discern which properties are affected by an administrative area.

3. State Agency DLRI Needs

Summary of Needs

DLRI needs include the content, quality, accessibility and general usability of land records. The stated needs among the study participants identified common high priority content elements and longer range, somewhat lower priority needs for other elements. DLRI quality needs varied depending on individual business function needs. Accessibility and usability needs essentially require workers and customers to be able to conveniently access the land records information in an efficient manner that is integrated with their work processes and at various locations including the office and sometimes through mobile devices. This section of the report provides more detail about DLRI needs.

DLRI Content Needs

DLRI content needs were identified by standardizing the needs survey responses into common named entities.

Fourteen primary DLRI entities were identified

- Assessor Property Characteristics

- Parcel Boundaries

- City and County Boundaries

- Major Public Land Owner

- Standardized General Plan Land Use

- Standardized Zoning

- Assessor Map Pages

- Township/Range/Section

- Flood Zone

- Assessor Building Characteristics

- Building Footprints

- Site Plans

- Business Locations

- Building Plans/Floor Plans

Table 3-1 describes the DLRI content entities, identifies the data type and presents relative level of need by surveyed programs.

Table 3-1 DLRI Data Entities

DLRI Entity	Description	Need	Type
Assessor Property Characteristics	Tabular data linked to Assessor Parcel Number (APN) consisting of property owner name, owner address, property address, valuations, property use code; tax rate area defining cities, special districts and other taxing districts; unformatted legal description referencing subdivision and lot, township, range and section. Content completeness and coding varies by county.	104	Tabular Data
Parcel Boundaries	GIS parcel boundary polygons with associated APN. Positional accuracy varies based on local agency mapping practices, generally ranges from +- 2 feet to +-5 feet for developed land areas and up to +-100 feet for vacant and low density developed areas.	101	Spatial Data (GIS)
City and County Boundaries	City and county boundary polygons aligned to parcel basemap.	87	GIS
Major Public Land Owner	Tabular parcel attribute associating APN with a standardized land owner identifier. Attributes are derived from Assessor records and other sources.	81	Data
Standardized General Plan Land Use	Standardized General Plan land use categories and the specific local agency General Plan land use category.	72	Data
Standardized Zoning	Standardized zoning categories and the specific local agency zoning category	61	Data
Assessor Map Pages	Scanned assessor map pages and index maps accessed by county, book and page number.	57	Image
Township/Range/ Section	GIS layer representing boundaries and corner points of the public land survey system (PLSS).	46	GIS
Flood Zone	Parcel level attribute of flood zone designation from FEMA FIRM maps based on GIS positioning analysis accurate to +- 150 feet.	43	Data
Assessor Building Characteristics	Tabular data linked to Assessor Parcel Number (APN) describing building characteristics such as structure type, age, number of rooms, etc. Content completeness and coding varies by county.	38	Data
Building Footprints	Outline of rooftops of major buildings derived from air photos. Completeness and availability varies by jurisdictions, often limited to large buildings.	25	GIS
Site Plans	Site development plans showing configuration of buildings, parking lots and major facility improvements on a parcel. Completeness likely to be limited.	23	Image
Business Locations	Identification of business name and type by street address obtained from local agency business license records.	23	Data
Building Plans/ Floor Plans	Scanned images of building floor plans showing location of interior walls and room layouts. Completeness likely to be limited.	16	Image
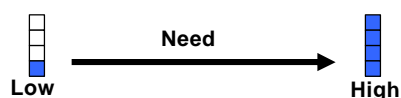
Need
Low ──────► High

Table 3-2 presents program categories that would benefit from having access to the DLRI data entities.

Table 3-2 DLRI Information Needs by Program Categories

	Economic Development	Education	Environmental Management	Environmental Protection	Homeland Security	Infrastructure Management	Public Safety	Social Programs
Assessor Property Characteristics	●		●	●	●		●	●
Parcel Boundaries	●	●	●	●	●	●	●	●
City and County Boundaries	●	●	●	●	●	●	●	●
Major Public Land Owner	●	●	●	●	●			●
Standard General Plan Land Use	●		●	●	●		●	●
Standardized Zoning	●		●		●		●	
Assessor Map Pages	●		●	●	●			
Township/Range/Section			●	●	●	●	●	
Flood Zone	●		●	●	●		●	
Assessor Building Characteristics	●				●		●	
Building Footprints	●				●		●	●
Site Plans	●	●			●		●	●
Business Locations	●			●	●			●
Building Plans/ Floor Plans	●				●		●	●

Data Quality Needs

DLRI data quality may be measured by multiple factors including positional accuracy, spatial and measurement consistency, data standardization and currency. The quality of the DLRI will greatly influence the level of benefit achieved by individual business functions. Data quality must be balanced in terms of benefit received versus additional cost. In nearly all cases, addressing the most demanding quality level will also satisfy the business function needs that do not require the high quality level. In many cases, State representatives stated that having the DLRI available at existing quality levels would improve their operations immediately.

Table 3-3 presents the benefit of the DLRI data quality elements for program categories.

Table 3-3 Data Quality Needs by Program Categories

Data Quality Needs	Economic Development	Education	Environmental Management	Environmental Protection	Homeland Security	Infrastructure Management	Public Safety	Social Programs
Positional Accuracy								
Ability to Link DLRI with State Program Data								
Spatial and Measurement Consistency								
Data Standardization								
Data Currency								

Need — Low → High

DLRI Accessibility Needs

Business activities of State agencies require DLRI to be highly accessible to their staff and in some cases available directly to their customers or the public at large. All DLRI information is not needed by all business functions or by all user classes and therefore appropriate security and access controls are needed to ensure only authorized users have access to view appropriate DLRI content. To a great extent,

the DLRI is public information, however, sensitivities to the release of owner information or legal release limitations must be enforced.

Table 3-4 presents DLRI accessibility needs for program categories.

Table 3-4 DLRI Accessibility Needs by Program Categories

Accessibility Needs	Economic Development	Education	Environmental Management	Environmental Protection	Homeland Security	Infrastructure Management	Public Safety	Social Programs
Availability to Those Who Need It	▣	▣	▣	▣	▣	▣	▣	▣
Restricted Access to Unauthorized Users	▣	▣	▣	▣	▣	▣	▣	▣
Integrated with Business Systems and Processes	▣	▣	▣	▣	▣	▣	▣	▣
Integrated with Existing GIS Systems	▣	▣	▣	▣	▣	▣	▣	▣
Independent Information Access Portals	▣	▣	▣	▣	▣	▣	▣	▣
Geographic Extent Available for Area of Interest	▣	▣	▣	▣	▣	▣	▣	▣
Accessible from Mobile Computers	▣	▣	▣	▣	▣	▣	▣	▣
Multiple Data Formats Linked and Integrated	▣	▣	▣	▣	▣	▣	▣	▣

Low ──── **Need** ────▶ High

DLRI Usability Needs

DLRI should be designed in a manner that supports different and sometimes contradictory State agency business needs. For example, some users may only wish to view DLRI as a color map highlighting properties by major owner, while others may want to highlight land use. Users may wish to access DLRI through different software systems and may need to evaluate changes in the DLRI over time. To accommodate the broad needs represented by the 115 business functions, the DLRI

must be designed in a manner that provides methods for users to adapt the data view to fit their needs.

Table 3-5 presents DLRI usability factors and their relative need by program categories.

Table 3-5 DLRI Usability Needs by Program Category

Usability Needs	Economic Development	Education	Environmental Management	Environmental Protection	Homeland Security	Infrastructure Management	Public Safety	Social Programs
GIS System Interoperability								
Support Multiple Views								
Historical Representation								
Linked Metadata								

Low → Need → High
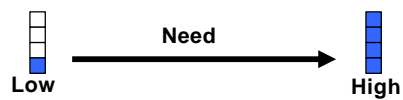
4. DLRI Status: California Counties, Other States and Federal Government

The need for digital land records information is universal among all levels of government and among any non-governmental agency that has land holdings. A great deal of thought and action has been directed towards the improvement of land records management by many agencies at the local, state and federal level throughout the United States.

This section provides a summary of DLRI status for each government level, with more detail provided in associated appendices. California counties are included as the primary agents for the capture and maintenance of DLRI in the state. Other states have implemented various DLRI strategies that may apply to California. Finally, it is important to be aware of federal initiatives that may have implications for California.

California Counties

During late 2003, Psomas conducted a survey of the fifty-eight California counties to determine the availability, quality, form, currency and maintenance characteristics of county level DLRI. The findings are presented in Appendix C: Availability of Digital Land Records from California Counties.

The report findings include:

- 88% of counties have a GIS parcel basemap available for at least a portion of their county.

- Thirty-eight counties have 100% of their parcels represented by GIS; four counties have over 90%, two counties over 75% and four counties under 75%. Eight counties did not report completeness.

- All counties but two use GIS or Computer Aided Drafting (CAD). Most use CAD to create individual assessor map pages.

- ESRI GIS software is used by forty-seven counties for parcel mapping.

- Positional accuracy is variable within and among counties.

- Urban area positional accuracy was better than +- 10 feet in thirty-one counties, better than +-50 feet in ten counties.

- Rural area positional accuracy was better than +- 100 feet in forty counties.

- Parcel GIS updates were performed monthly or more frequently by twenty-eight counties. Fourteen counties performed updates between monthly and semi-annually.

- Twenty-two counties keep their maps current within one month, eight counties within six months and fifteen counties annually.

- Twenty-three counties have data use agreements, most other counties are developing agreements.

- Forty-two counties have a fee for parcel GIS data. Five counties charge more than $3,000 for a countywide file, while the average cost for the other counties was $240. Twenty-five counties do not charge other governmental agencies. Two counties did not respond to the fee question but sell their parcel data for up to $2 per parcel.

- Of the forty-six counties responding to tax roll costs, six counties charge nothing, four indicate prices greater than $3,000 and the others averaged $620.

- Thirty-two counties can provide updates to property owner records and updated assessor maps monthly.

- Forty-three counties have assessor map pages available in digital scanned format.

- Commercial data providers are often the preferred distribution channels of tax roll information and assessor maps. Several firms were cited.

The counties are the primary source of land records data, primarily through the assessor offices. Most counties are proceeding with or have implemented GIS parcel mapping programs and perform regular maintenance. The GIS parcel maps are variable in positional accuracy, content and format largely due to the individual GIS program approaches and the lack of state and federal GIS data models and standards when the county programs were developing.

Counties are beginning to upgrade their GIS parcels to improve positional accuracy to align with aerial orthophotography that is available at 1 to 0.3 meters or better. During this upgrading process, feature level metadata are collected. Recent publishing of advanced parcel geodatabase models by ESRI are being readily adopted by counties. These evolutionary changes and improvements to existing parcel GIS data are likely to accelerate in the coming years triggered by the increasing availability of high accuracy orthophotography and Global Positioning

System (GPS) survey measurements. However, no state standards and procedures for GIS parcel mapping are available to guide statewide consistency of the county efforts.

Other States

Many states have initiated statewide DLRI programs. They represent a diversity of approaches and varied results although the program goals are common to one another and consistent with California's. Appendix D provides a snapshot of numerous state DLRI programs.


Figure 1 States with Cadastral Program Websites Shown in Blue
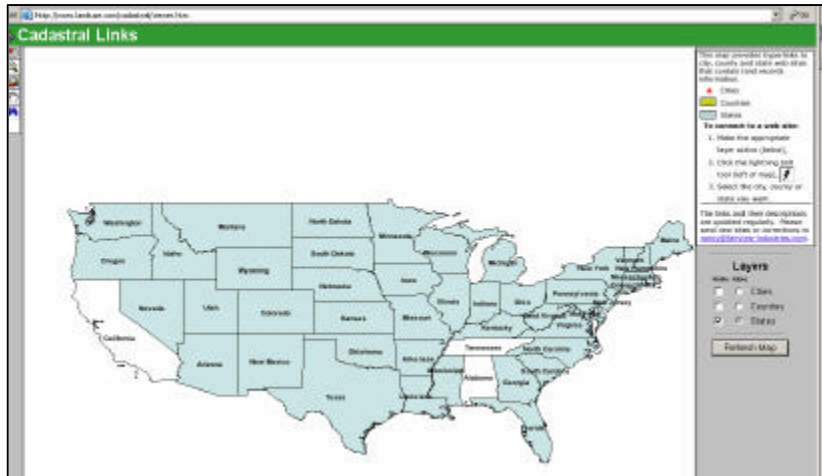
Although varied, other state approaches typically include some form of state leadership to coordinate local government activities, to facilitate standardization and to accelerate existing data development and improvement activities. Emphasis varies by state, with focus on survey control, GIS parcels, statewide assessor databases and digital assessor maps. Many states have developed public access portals to serve their DLRI data. In most states with active DLRI programs, the state legislature has established program directions, responsibilities and funding mechanisms.

DLRI Implementation Roles

Although the roles of other states vary, four primary roles emerge as being important for implementing a DLRI program. These roles may be performed by different entities, not necessarily requiring the state to lead the effort on all fronts.

1) Advocacy and Coordination – Advocacy includes defining the program vision, enacting enabling legislation, policy development, developing interagency partnerships, management of interagency agreements and standards adoption. Coordination roles address interagency and user coordination necessary in a collaborative program.

*2) **Data Development and Maintenance*** – Includes initial DLRI data development and enhancements to meet statewide standards. Maintenance updates the DLRI as needed based on official changes to land records and as mapping enhancements occur. Counties are currently responsible for maintaining an inventory of land parcels and ownership information supporting assessor tax collection processes.

*3) **Data Aggregation*** – This role aggregates county DLRI data into a statewide integrated DLRI repository. The aggregation process will assure the statewide DLRI conforms to defined standards and reduces the variability of the county source data.

4) ***Data Provision*** – A DLRI access portal provides users multifunctional access to the statewide DLRI and linkages to the potentially more robust county DLRI data. Federal programs such as Geospatial One Stop and the National Map (Appendix E) may be used as a means for DLRI provision. The data provider role includes maintenance of the technology infrastructure necessary for effective deployment of the needed applications.

Table 4-1 summarizes the range of potential roles as derived from analyzing DLRI programs in other states.

Table 4-1 Potential State Roles and Investment Levels

Low ⟵ **State Investment** ⟶ **High**

1) Advocacy and Coordination					
DLRI Standards	None	Voluntary Guidelines	Mandatory Legislation		Incentive Based
Program Management	None	Committee	Technical Manager		Technical Manager & Technical Committee
Incentives	None	Standards and Guidelines	Software		Funding
Funding	None	Unfunded Mandate		One Time Seed Funding	Sustained Funding
Partnership Development	None	Ad hoc		Letter of Agreement	Formal Agreements
Legislation for Statewide DLRI	None	Program Definition			Program Definition and Funding
2) Data Development and Maintenance					
Coordinated Interagency Program	None	Ad hoc Local & State		All Local Government and State	Local, State, Federal
DLRI Base Layer Content	Assessor Data & Maps	Assessor data, Maps, & GIS Parcel Centroids		Assessor Data, Maps, & GIS Parcel Polygons	Assessor Data, Maps, GIS Parcel Polygons, Jurisdictional Boundaries & Integrated Survey Records
Interagency DLRI Sharing	Ad hoc	Legislated Mandate		Negotiated Sharing Agreements	Incentive Based Sharing
DLRI Development	Ad hoc	Legislated Mandate		Negotiated Sharing Agreements	Incentive Based Sharing
DLRI Maintenance	County				State
3) Data Collection and Aggregation					
Collect Data	Links to Data		Collect and Serve Available DLRI		Collect and Serve Statewide DLRI
Assembles Data From Counties	None	Private Sector			State
Merge to Common Standard		Private Sector			State
Edgematch	None	County Initiated	Private Sector		State
Frequency of Collection	Yearly		Quarterly	Monthly	Daily
4) Data Provision					
Method	None	Link to Data for Download		Web Viewer	Advanced Functions and System Integration
Users	State Only		All Government		Public

Principles and Best Practices of Other States

DLRI Implementation Principals and Strategies

1. DLRI is a fundamental information component necessary to support diverse government operations.

2. State leadership is needed to define a vision and process for the DLRI program.

3. Coordination between the state, counties, federal and tribal governments will maximize program success.

4. DLRI data is collected and managed by county assessors as a core business function. The statewide DLRI should be developed through aggregation of county level DLRI.

5. Provide financial incentives to develop and sustain county partnerships.

6. Existing national standards for metadata, parcel GIS databases, open GIS and GIS interoperability should be adopted where appropriate.

7. Different levels of DLRI content and accessibility are needed to fulfill governmental information needs while protecting the privacy of individuals.

8. Critical DLRI content includes GIS parcels, assessor parcel attribute information, assessor map images and survey control data.

9. Access to DLRI should be provided through the Internet with appropriate restrictions for privacy and security purposes.

10. DLRI specifications must accommodate variations in data quality reflecting the diverse characteristics of land records in California.

11. The DLRI content will improve in quality and expand in content over time through improved integration with GPS, surveys, orthoimagery and assessor records.

12. County DLRI data may be more comprehensive than the State standards.

13. DLRI program should involve interdisciplinary team including assessors, surveyors, GIS professionals, IT professionals and possibly the private sector.

The primary elements of a successful land records program based on other states' experience include:

- State leadership

- Clear vision and identification of program participant roles

- Standards and specifications for data and systems

- Policies for privacy and cost recovery

- Funding for one time investments and sustaining the program

- Partnerships with counties, federal and tribal governments who maintain land records data

- Incentives for data providers to participate in the program

- Commitment to effective and timely maintenance of the data

- Integration of GIS parcels, scanned assessor maps, assessor property information and survey records

- Technology infrastructure and software applications to support data maintenance, access and analysis

- Flexibility to address diverse needs and circumstances among the program stakeholders

- Education program to communicate the value and importance of DLRI to policy makers and the public

Federal Programs

The federal government has developed visions and plans for implementing a national spatial data infrastructure coordinating multi-level governmental agencies to manage and use digital geographic information. The Federal Geographic Data Committee has developed DLRI related content standards addressing national, regional, state and local data with a goal of enhancing consistency of DLRI among all levels of government. The National Map further emphasizes collaborative multilevel strategies for accessing information using Web services to enable users to access national to local data through web portals. The Geospatial One Stop is a federal initiative to provide a single portal for accessing federal geospatial data.

These initiatives represent major federal strategies and actions to address challenges faced by California to better standardize, integrate, publish and access DLRI information. Further, as California addresses DLRI challenges, it should leverage the federal programs to better serve the nationwide interests in California DLRI. Appendix E: Federal DLRI Programs presents additional information on federal efforts.

DLRI Related Initiatives and Trends

Throughout California, various initiatives and trends are developing data and interagency coordinating structures that contribute to a statewide DLRI program. These activities reflect the increasing awareness that regional and multiagency geographic data management programs are needed to effectively address geographic and land information needs.

California Spatial Reference Center (CSRC)
Geodetic Control Network Plan
CSRC has developed a Master Plan for a Modern California Geodetic Control Network that lays out a plan for the development of an enhanced statewide geodetic control network that among other things will provide a statewide network of control points. Enhanced geodetic control would provide an underlying framework for mapping all land in California and provide the potential for improved positional accuracy and spatial and measurement consistency of DLRI in the future. http://csrc.ucsd.edu/general/csrcMasterPlan.html

Regional GIS Cooperatives

Regional GIS cooperative programs within California are evolving into regional affiliations that pursue inter-agency GIS projects. These entities are addressing core issues such as standards, data sharing and data development, including parcel data. Cooperatives may be used to develop and sustain standard DLRI within regional areas. The forms of the regional cooperatives include formal cooperatives, informal associations and professional associations. Examples of regional cooperatives include Santa Clara County Region, Central Coast Joint Data Committee, Sacramento County GIS Cooperative, Yolo County GIS Cooperative, Channel Islands GIS Collaborative, SANGIS in San Diego and BAAMA for the San Francisco Bay area.

Regional GIS Councils

Regional GIS Councils were conceived by the California GIS Council as a means of coordinating GIS efforts among the many local government agencies and encouraging regional areas to address their needs through multi-level interagency coordination. Nearly fifteen Regional Councils have formed and many are active in addressing GIS needs and could serve as regional DLRI coordinating bodies.

5. Statewide DLRI Vision

A vision for enhanced accessibility and usability of land records in California incorporates the identified land records information needs with best practices of other states while giving consideration to local government needs and current DLRI development levels.

DLRI Vision: California Digital Land Records Information will encompass the entire area of California with up to date property information for use by all governmental agencies, businesses and private interests. The DLRI system will transform the existing fragmented nature of land records information into a more consistent, useable and accessible form through interagency coordination and standards adoption. The program will:

- Represent land information as an integrated set of digital information including GIS parcels, assessor parcel attributes, images of assessor maps and survey control information

- Support regional and statewide programs requiring land records including homeland security, public health, economic development, infrastructure management and environmental protection

- Be developed and maintained through intergovernmental participation between state, federal, county and tribal governments

- Be developed based on common statewide standards that are compatible and permissive of county level data standards which may be more detailed and comprehensive

- Be compatible and interoperable with other statewide framework GIS data

- Include sustained funding mechanisms to assure continuous maintenance of the DLRI

- Be accessible for data download, data views and/or through Web services to government entities through a state sponsored Web portal

- Be available to the public, subject to security/confidentiality measures and requirements, through Web based portals provided by some combination of state, federal and local government and the private sector

- Provide security and privacy protections to protect the interests and welfare of the citizens of California.

6. DLRI Data Profiles and Standards

This section describes possible approaches for defining data standards, using the concept of data profiles to apply unique standards for different DLRI user groups.

DLRI Data Profiles

Consistency of content, format and completeness of DLRI information is critical to enable regional or statewide analysis. However, the primary sources of DLRI information are counties and local agencies that have varied DLRI content and format. Given the need for standardization of DLRI, a strategy is needed to incorporate local data into a standardized statewide DLRI.

Other states have adopted standardization strategies that provide results in the short term and long term. As outlined by the Western Governor's Association Cadastral Core Data Report, a strategy of publishing minimum DLRI content intended to support specific business needs provides short-term results. Content standards are defined for specific user groups. A core content standard defines minimum content and then expanded content standards build on the core standard with additional information. The variations on the core content standard address data security and confidentiality by limiting access to DLRI profiles containing sensitive information.

California will need to define and adopt content standards (profiles) that reflect the business needs of DLRI users and consider privacy, security and use restrictions of the DLRI. The following DLRI content profiles reflect different information content needs, privacy and access concerns. County or source DLRI provider profiles reflect the full content of DLRI that is maintained, but may not be included in statewide DLRI profiles.

Figure 6-1 Possible DLRI Content Profiles

DLRI Element	Core	Federal/State Government	Public	County
APN	●	●	●	●
Parcel Boundaries	●	●	●	●
Address	●	●	●	●
Assessor Roll Data	●	●	●	●
Assessor Maps	●	●	●	●
Owner Information		●		●
Property Characteristics				●
Tax Rate Area		●		●

GIS Standards

Standards defining DLRI GIS representation are needed to define the content and structure for the statewide DLRI and provide uniformity of data across the state. The FGDC has published cadastral (parcel) content standards, ESRI has published several Geodatabase models for DLRI data and other states and California counties may be sources in developing the state DLRI GIS standard.

Standards remain varied among the states, at local levels and at the federal level. The FGDC cadastral content standard is very broad addressing the diversity of land definitions encountered within the states. It provides a framework for selecting features suited to particular users, rather than a structure that must be implemented in its entirety. States have tended to adopt standards that are balanced with their program goals which often use GIS parcels as a spatial index linked with more precise assessor records. Local governments are adopting standards that require high spatial accuracy (+-2 feet or better) and include detailed lot dimensions and easements in addition to parcel boundaries.

A State standard needs to address the content, graphical representation, positional accuracy, attribution, currency and format of the DLRI. The standard should include metadata definitions to describe qualitative characteristics of individual GIS features.

A State standard may address varying levels of accuracy or content to reflect varied land development patterns and differing needs for DLRI content. For example, agricultural and forest lands may have a lower positional accuracy specification than urbanized lands with extensive infrastructure and high property values.

Development of the State standard should involve representation from various disciplines to assure the standard has long term viability and serves its diverse users well.

7. DLRI Implementation Options

Achieving the State DLRI vision may be accomplished through different strategies varied by different program priorities, implementation constraints and participant roles. As illustrated in Section 4, other states have applied different strategies and priorities in developing their DLRI programs that may be applied in California.

This section presents five possible DLRI implementation options for DLRI base layers consisting of assessor property attributes, assessor map images and GIS parcel data. Enhanced DLRI content may follow similar strategies once the DLRI base layers are implemented.

Each option defines investment level combinations of State roles of advocacy, coordination, data development, data aggregation and data provision. Variations in role responsibilities and investment levels differentiate the options. A figure is provided for each option showing estimated new benefits and costs derived from the additional state investment in the DLRI program.

Five DLRI implementation options are considered:
- Option 1: Maintain DLRI Current Status
- Option 2: Collect and Use Existing DLRI
- Option 3: Seed Funding for New DLRI Development
- Option 4: State Funded DLRI Development, Data Provision and Enhanced Access
- Option 5: State Funded DLRI Development, Private Sector Data Provision and Enhanced Access

DLRI Implementation Option 1: Maintain DLRI Current Status

This option reflects current DLRI program coordination characterized mainly by a patchwork of practices by various State programs to fulfill their internal program needs.

Table 7-1 Option 1 Investment and Benefits[2]

Advocacy and Coordination

- Minimal coordination among State programs, no external coordination

Data Development and Maintenance

- Individual State program coordination with counties
- Counties maintain DLRI data according to individual internal approaches

Data Aggregation

- Some multi-county data collection for individual State program use

Data Provision

- By State programs for their internal use

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[2] Costs and benefits are beyond the current level of State investment

DLRI Implementation Option 2: Collect and Use Existing DLRI

This option is focused on collecting existing DLRI information from counties,

aggregating it into state level data sets and providing it only to state programs.

Table 7-2 Option 2 Investment and Benefits[3]
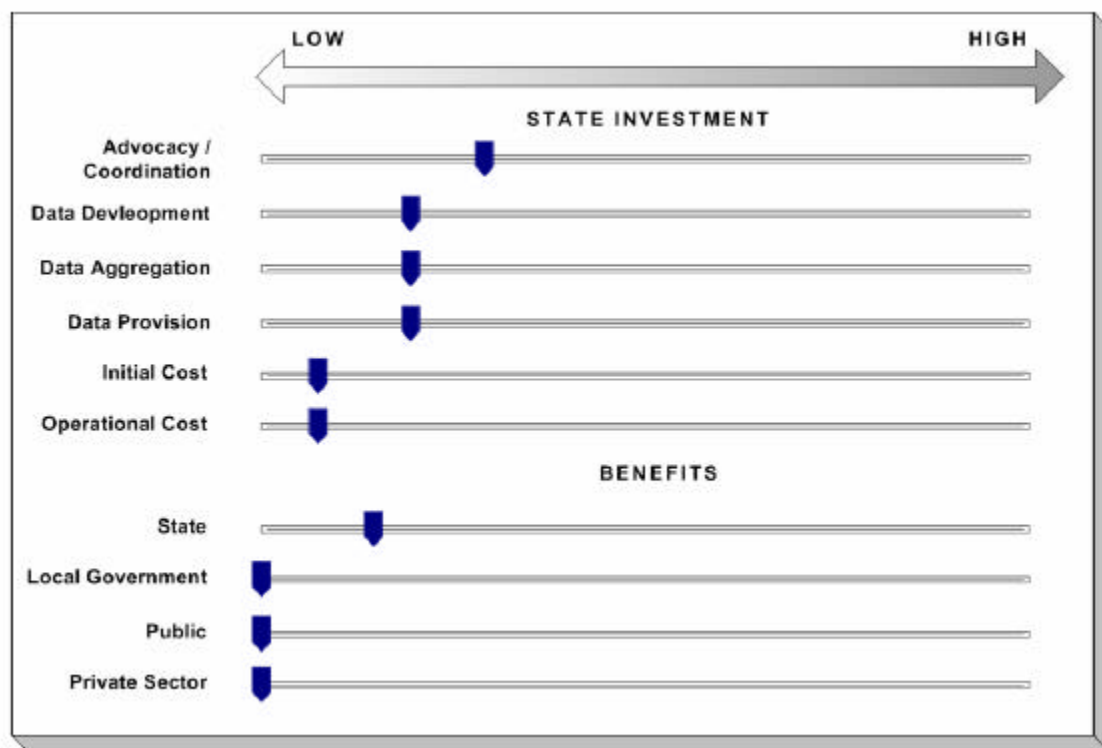
Advocacy and Coordination

- State coordinates with counties for DLRI partnership
- State coordinating committee coordinates State DLRI use

Data Development and Maintenance

- State adopts minimum DLRI content and format standard for State use
- Counties maintain DLRI data according to individual county approaches

Data Aggregation

- Acquire existing DLRI from counties if a reasonable cost
- No GIS "edgematching" or new data development
- Data acquired annually
- County data processed to conform to state standard

---

[3] Costs and benefits are beyond the current level of State investment

- DLRI content includes GIS parcels, scanned assessor map sheets, limited parcel attributes

Data Provision

- Statewide GIS parcel data stored on server accessible for download by State programs

DLRI Implementation Option 3: Seed Funding to Meet State DLRI Standard

This option uses limited State funding to steer local DLRI investments to comply with State standards.

Table 7-3 Option 3 Investment and Benefits[4]
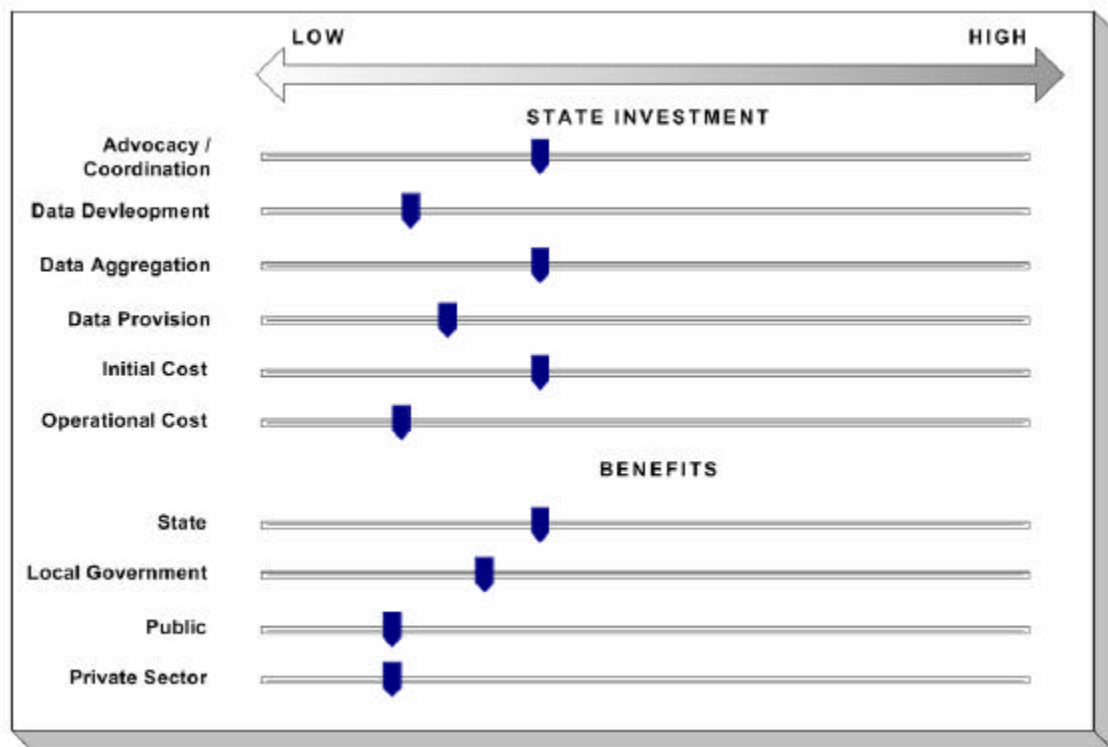
Advocacy and Coordination

- State coordinates with counties for DLRI partnerships
- Interdisciplinary DLRI Technical Steering Committee sets standards and guidelines
- DLRI statewide standards and local government guidelines
- DLRI GIS data development procedures
- Active State sponsored outreach and education

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[4] Costs and benefits are beyond the current level of State investment

Data Development and Maintenance
- One time seed funding as incentive for counties to participate
- Partnership for joint GIS parcel development where counties are developing GIS parcels and scanned assessor map sheets
- Edgematch GIS parcels along county boundaries for new DLRI
- Partnership counties maintain DLRI data to statewide standard
- Other counties maintain DLRI data according to individual county approaches

Data Aggregation
- State collects county data at least annually and processes to conform to state standard.
- DLRI content includes assessor data, scanned assessor maps, GIS parcels

Data Provision
- Statewide GIS Parcel data stored on server accessible for download by State programs.

DLRI Implementation Option 4: State Funded DLRI Development, Data Provision and Enhanced Access

This option develops and maintains a comprehensive standardized DLRI through close coordination with counties and other agencies. Internet data access portal provides access to State and local DLRI data.

Table 7-4 Option 4 Investment and Benefits[5]

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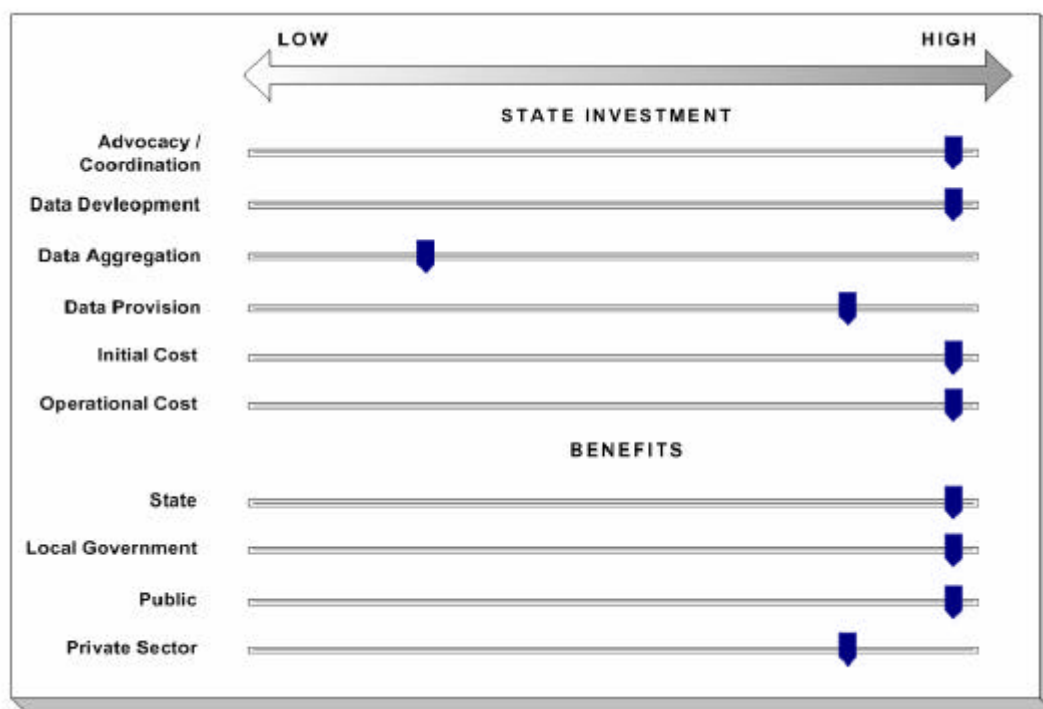
[5] Costs and benefits are beyond the current level of State investment

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Advocacy and Coordination

- Dedicated full-time DLRI Technical Manager
- Interdisciplinary DLRI Technical Committee sets standards and guidelines
- DLRI statewide standards and local government guidelines
- DLRI GIS data development procedures
- Active State sponsored outreach and education

Data Development and Maintenance

- State and county partnerships complete parcel GIS for the entire State and bring existing data into conformance with State standards
- Partnership to scan all assessor map sheets
- Counties edgematch all GIS parcel data to form continuous statewide parcel map
- All counties maintain DLRI data to State standard

Data Aggregation

- County DLRI data collected and assembled into statewide DLRI
- DLRI content includes parcel attributes, scanned assessor maps, GIS parcels, survey control and jurisdictional boundaries
- Periodic county updates as they occur up to a monthly frequency

Data Provision

- A State portal provides web-based access for viewing, query and download to all government and public users
- DLRI web services are integrated with other agency portals
- Web site provides county level DLRI links

DLRI Implementation Option 5: State Funded DLRI Development, Private Sector Data Provision and Enhanced Access

This option is identical to option 4 except that data provision and access is through private sector services. The State coordinates the development of the statewide DLRI and provides for download of unique data profiles for government, the private sector and the general public. Value-added Web-based services are provided as needed by the private sector. The public benefits by higher level of service by may incurr some service costs that are higher than Option 4.

Table 7-5 Option 5 Investment and Benefits[6]
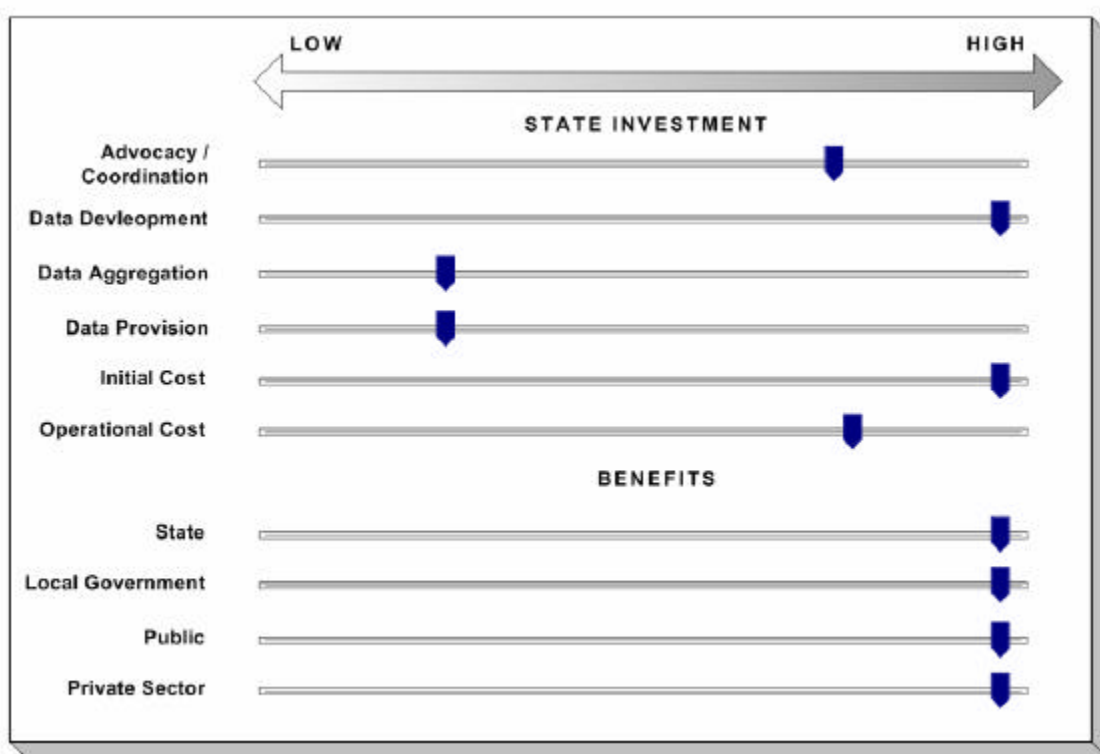
Advocacy and Coordination

- Dedicated full time DLRI Technical Manager
- Interdisciplinary DLRI Technical Committee sets standards and guidelines
- DLRI statewide standards and local government guidelines
- DLRI GIS data development procedures
- Active state sponsored outreach and education

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[6] Costs and benefits are beyond the current level of State investment

Data Development and Maintenance

- State and county partnerships complete parcel GIS for the entire State and bring existing data into conformance with State standards
- Partnership to scan all assessor map sheets
- Counties edgematch all GIS parcel data to form continuous statewide parcel map
- All counties maintain DLRI data to State standards

Data Aggregation

- County DLRI data collected and assembled into statewide DLRI by private sector
- DLRI content includes parcel attributes, scanned assessor maps, GIS parcels, survey control and jurisdictional boundaries
- Periodic county updates as they occur up to a monthly frequency

Data Provision

- State provides for download of unique data profiles for government, the private sector and the general public
- State provides limited web services as needed to meet customer demand for government services
- Private sector provides web-based access for viewing, query and value added services
- Private sector establishes fee for use of expanded services web sites

Funding Mechanisms

DLRI funding is needed for the initial DLRI development, enhancement and ongoing maintenance. Sufficient and sustainable funding will help ensure the success of the selected DLRI implementation option.

Several DLRI funding mechanisms are addressed below:

Agency Funding – Agency funding is through the general fund or special funds within the State budget. General funds are typically limited and in high demand, thus difficult to secure for new programs such as DLRI.

DLRI Data Sales – DLRI sales by public agencies provide supplemental revenue that may be redirected to DLRI operations. Counties have imposed highly varied data sales programs providing limited program revenue.

Grant Funding – Grants are available through many sources but are typically one-time funding for programs that must fulfill specific grant criteria. Grants may be used to initiate phases of DLRI development but will require additional ongoing funds.

New DLRI Fees – The State and counties could implement DLRI fees associated with the recording of land records documents that impact the level of maintenance of the DLRI. As land records activities increase, so would funding. Once implemented, this approach presumably could result in sustained DLRI funding.

For example, Oregon's ORMAP program is one model that may be applicable to California www.ormap.org. Oregon has 1,350,000 tax lots and approximately 800,000 land documents recorded each year that generates $800,000 for the Oregon Land Information System Fund. Extrapolating these numbers to California with its 12,000,000 parcels would project over 7,000,000 land documents recorded annually. If California had a DLRI fee of $1.00 on each land document recorded, the annual revenue would be approximately $7M.

Private Sector Investment – With adequate rights for data distribution and copyright protection, private sector investment may be used to fund the enhancement and ongoing operations of the statewide component of DLRI.

Unfunded Mandate – Legislation could require counties to maintain DLRI to a state standard and make it available for use.

Implementation Constraints and Issues

Several DLRI implementation challenges must be addressed. These issues reach beyond technology and funding challenges that are inherent in the program.

Privacy – Privacy of individual personal information associated with land records must be respected and managed in a manner that only provides the information to those who are authorized and need to know. Although all of the proposed DLRI data content is public record, the increased accessibility to the information may enable increased exposure of individual citizen information. To manage privacy, policies for information release should be established and appropriate security by class of user should be defined. Other states have implemented data profiles that define DLRI content by class of users, thus minimizing the potential of inadvertent release of information.

Opposition Groups – Potential changes resulting from the implementation of a statewide DLRI program is likely to create conflict among various interests who may not wish to see DLRI implemented in a particular manner. The primary interests include those adverse to new fees and those whose livelihood benefits from the absence of readily accessible DLRI.

Resistance to new fees – DLRI program funding may involve the establishment of new fees (possibly a land title recording fee) to provide necessary funding to develop and sustain the program. Although a nexus demonstrating the appropriateness of a fee should be established, groups may be adverse simply based on a principal of no new fees.

Private sector data providers – Existing business interests provide assessor information and maps to government and businesses. The development of a DLRI program that eliminates access costs to DLRI would potentially disrupt the business model of some firms.

Counties for Reduced Revenue – Some counties in California derive a limited but important revenue stream from the sale of assessor data, maps and GIS files. Implementation of a statewide DLRI program could provide an alternative means of accessing the data and reduce revenue to counties from data charges. An incentive funding program for counties could be used to offset potential data sales revenue losses.

Counties for Standards Compliance – Some counties have significant investments in DLRI data development that may not comply with future DLRI guidelines or standards. Adopting new and different standards could impose a new challenge to counties if they are required to alter their existing DLRI to conform to the new standards.

8. DLRI Costs

This section estimates costs for the various implementation options.

Cost estimates are for new State program costs only and do not account for existing costs at the state, federal or local level. The costs are intended to help differentiate the DLRI options, however further detailed analysis is required to establish specific implementation budgets for any given option.

Cost Analysis

The methodology for estimating costs is based on comparable costs for similar projects with consideration for the scale of work needed in California. Assumptions include: implementation efforts will be statewide, work volumes will produce economies of scale and standardization efficiencies and initiatives may be phased over time.

Initial implementation costs and ongoing costs represent a rough cost estimate for each option. Option 1 is not included since it involves no additional investment. Options 2, 3 and 4 represent increasing levels of DLRI completeness. Option 5 represents an alternative approach to Option 4, using the private sector for data aggregation and data provision roles. Appendix G provides additional cost detail.

Initial Implementation		Option 2	Option 3	Option 4	Option 5
Advocacy and Coordination		$ 8,000	$ 181,000	$ 270,000	$ 270,000
Data Development and Maintenance		$ -	$ 1,455,000	$ 9,391,000	$ 9,391,000
Data Aggregation		$ 259,000	$ 459,000	$ 75,000	$ 75,000
Data Provision		$ 6,000	$ 6,000	$ 804,000	$ 50,000
	Total	**$ 273,000**	**$ 2,101,000**	**$ 10,540,000**	**$ 9,786,000**
% to Local Government		0%	69%	89%	96%

Ongoing		Option 2	Option 3	Option 4	Option 5
Advocacy and Coordination		$ -	$ 9,000	$ 110,000	$ 110,000
Data Development and Maintenance		$ -	$ -	$ -	$ -
Data Aggregation		$ 119,000	$ 319,000	$ 25,000	$ 25,000
Data Provision		$ 6,000	$ 6,000	$ 260,000	$ 150,000
Annual Local Government Support				$ 5,400,000	$ 5,400,000
	Annual	**$ 125,000**	**$ 334,000**	**$ 5,795,000**	**$ 5,685,000**

Option 2 – This is the lowest cost to implement but requires a proportionally high ongoing cost. The benefits from this option are limited since it only includes the collection of available, limited cost data suppliers and provides only internal state DLRI access.

Option 3 – One-time seed funding costs, advocacy and expanded data aggregation efforts increase the initial implementation costs. Ongoing costs remain high for the aggregation of non-standardized data.

Option 4 – Major costs are for data development to complete the GIS parcel base, scan all assessor maps and to implement a DLRI access portal. Ongoing costs achieve economies of scale with increased standardization of DLRI source data. Data provision costs reflect the development and ongoing operations of a DLRI portal serving all interests with multipurpose information access capabilities. Annual local government support provides funding to assure ongoing DLRI maintenance consistent with State standards.

Option 5 – Major State investments are for data development to complete the GIS parcel base. Reliance on private sector investments for data provision reduce costs for State developed DLRI portal. Annual local government support provides funding to assure ongoing DLRI maintenance consistent with State standards.

9. DLRI Benefits

Having a statewide DLRI system in place to support State business processes would provide varying levels of benefit[7]. In general, the benefits can be grouped into the following benefit types.

Improved resource utilization – Agencies can use standardized data and technical resources more efficiently. Less time is required to find and reformat land records information into useable forms.

Improved information access – Online digital land records information can be easily accessed, often providing new opportunities for use that were not feasible through hardcopy or distributed solutions, thereby increasing worker efficiency.

Redundancy reduction – Agencies can reduce or eliminate redundant data collection and management efforts.

Improved information quality – Better information quality as reflected in information currency, consistency, spatial accuracy and standardization enables more consistent decision making processes and automation while reducing extraneous information review and validation.

Improved decision making – DLRI information, being more accessible and adaptive to various needs, can better support decisions through data analysis and visualization.

Cost reduction – Agencies can reduce land records management and analysis costs through data sharing and partnerships, reduced data duplication and enhanced computer operations, leading to more efficient use of data and technical and human resources.

Error reduction – Access to appropriate information of suitable quality will reduce errors that are currently made due to inadequate or inaccessible land records information.

Enhanced information maintainability – Agencies can more easily update information that is based on standardized data format and rules for data entry.

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[7] California DLRI Requirements and Findings, Appendix B

Enhanced data dissemination – Agencies can more easily disseminate land records data to federal, state and local governments and to the private sector.

Improved information sharing and communications – Agencies can more easily exchange information if it is based on a common set of standards, thus improving the efficiency and effectiveness of coordination.

Effective computer operations – Agencies can enhance application effectiveness through reduced information retrieval times, reduced storage requirements and standardized software requirements when using standardized data.

Other Benefits

Broader DLRI benefits can be expected with increased availability and usage. Analysis of other states and counties identified a broad range of benefits that likely will accrue among State programs. Some of the probable benefits realized by others include:

Escaped Assessments – Richland County, South Carolina overlaid GIS parcel boundaries onto orthophotography to identify property improvements not on the tax roll resulting in several million dollars of escaped property valuation to the tax roll. Martin County Florida, improved completeness and accuracy of assessments for cell towers, franchise fees, assessment districts.

Bernalillo County, New Mexico – Increased revenue by $1M per year by better tracking of business license fees, connection fees, use fees, increased accuracy and better apportionment of revenue.

Better Assessments of Unique Properties – Ability to increase the search area for comparable properties into adjacent counties where common standards are applied within the DLRI.

Quicker Assessments – Parcel level GIS programs that integrate with building permit systems and digital map submission processing for new land development can shorten the time of processing new assessments, increasing the valuation of certified roll files and shortening the collection of taxes due, rather than relying on supplemental tax rolls that delay collection of revenue.

West Nile Virus (WNV) – Parcel addresses and GPS locations may be used to identify WNV case locations. Outreach programs can be directed to all addresses

within proximity of cases. Treatment areas can be targeted based on land use and individual property owners identified for notification or assessment.

Accuracy of Information – An enhanced DLRI with comprehensive situs addresses and frequent updating will increase the viability of providing land records information to the public via the Internet. Currently, situs address accuracy and completeness limit utility.

Crime Analysis – A GIS parcel basemap and addresses provide a means of evaluating distribution of crimes, identifying property owners where specific criminal activity is performed. Santa Clara County Regional Crime Analysis Program (RCAP) uses a regional GIS basemap to better coordinate data sharing and analysis among multiple law enforcement agencies.

Criminal Apprehension – An accurate DLRI provides law enforcement personnel with accurate property ownership information necessary for issuing warrants. Detailed site maps may be used to plan raids.

Disaster Declaration – Following major disasters such as floods, fires and earthquakes, DLRI may be used to associate valuation data and improvement characteristics with areas affected more accurately. This rapid assessment process can help officials apply for emergency funding quickly.

Reduce Public Service Staffing Levels – Providing property based information to the public and business interests through the Internet improves service levels, reduces the staffing load at public information counters (10% reduction of counter staff by Los Angeles County Assessor office alone), reduces trip miles to government offices thus improving air quality and reducing congestion.

Audit Fictitious Businesses – DLRI can be used to link fictitious business filings with business license databases to identify unlicensed businesses. The City of Ontario, California increased conformance with business licenses using GIS and increased annual revenues by nearly $500,000 per year.

Farmland Crop Assessment – Use of DLRI GIS parcels and aerial photography permits effective and accurate identification of crops without visiting farms in person. This results in greater accuracy, lower cost and an accurate and permanent record of crops.

Department of Finance Population and Housing Estimates – DLRI can draw upon the Assessor use codes and dwelling unit information to provide an up to date count of structures by type as input into annual population and housing estimates.

10. Appendices

Appendix A: Glossary

Appendix B: California DLRI Requirements and Findings

Appendix C: Availability of Digital Land Records from California Counties

Appendix D: State DLRI Programs

Appendix E: Federal DLRI Programs

Appendix F: Study Participants

Appendix G: Implementation Cost Detail

Appendix A: Glossary

Cadastral	Pertaining to land ownership. Cadastral records define ownership boundaries and owner information associated with individual parcels of land.
DLRI	Digital Land Records Information. An integrated computerized system linking GIS maps, parcel information, land records, property based administrative records and other data associated with specific land locations. A DLRI system supports diverse governmental and private sector business activities through increased efficiency in accessing and using land information.
Edgematch	An editing procedure to ensure that all features that cross adjacent map sheets have the same edge locations forming an uninterrupted continuous map.
Land Information	Descriptive characteristics of land that may include topographic, cultural, administrative, environmental, infrastructure, or demographic information.
Land Records	Public records defining boundary and ownership information about specific parcels of land.
Orthophotography / Orthoimagery	A photograph or imagery, generally taken from the air, that has been enhanced such that features on the map have been positionally corrected to eliminate distortions in a way that allows for accurate measurements of features and relationships between features, directly on the photograph.

Appendix B:
California DLRI Requirements and Findings

This section presents a summary of State DLRI requirements identified through interviews and surveys conducted with program staff. The findings are presented in a summary table format associating needs with specific program business functions supported by a statewide DLRI.

Table B1 is a listing of program participants of the requirements study.

TABLE B1: PROGRAMS PARTICIPATING IN DLRI REQUIREMENTS

Survey ID	Agency	Program	Participant	Interview
ARB - 1	Air Resources Board	PTSD, Emission Inventory Program	Beth Schwehr	
ARB - 1	Air Resources Board		Todd Sax	Y
ARB - 2	Air Resources Board	SDD, Toxic Air Contaminant Program	Michelle Houghton	
ARB - 3	Air Resources Board	RD, Health Effects Research Program	Cynthia Garcia	
BOE - 1	Board of Equalization		Ralph Davis	Y
CAL - 1	CALTRANS	Right of Way Division	Greg Lundblad	Y
CAL - 2	CALTRANS	Right of Way Engineering	John Grisafi	Y
CAL - 3	CALTRANS	Transportation System Information, Office of GIS	Roger Ewers	Y
CDF - 1	CA Department of Forestry and Fire Protection	Southern Region Office – Forest Practice GIS	Jolia Koo	
CDF - 1	CA Department of Forestry and Fire Protection	State Forests	Sebastian Roberts	Y
CDF - 2	CA Department of Forestry and Fire Protection	Fire and Resource Assessment Program	Chris Keithley	
CDF - 3	CA Department of Forestry and Fire Protection	Fire and Resource Assessment Program	Robin Marose	
CDF - 4	CA Department of Forestry and Fire Protection	FRAP - NCWAP	Fay Yee	Y
CDF - 4	CA Department of Forestry and Fire Protection	North Coast Watershed Assessment Program, Fire and Resource Assessment Program	Russ Henly	Y
CDF - 5	CA Department of Forestry and Fire Protection	Technical Services Section, Lands Unit	Marc R. Van Zuuk	Y
CDF - 6	CA Department of Forestry and Fire Protection	Nevada-Yuba-Placer Unit	Sean Griffis	Y

TABLE B1: PROGRAMS PARTICIPATING IN DLRI REQUIREMENTS

Survey ID	Agency	Program	Participant	Interview
CHP - 1	CA Hwy Patrol	Info Management Division – Network Management Section	Ray Patron	
CHS - 1	California Dept of Health Services	Environmental Health Investigations Branch	Andrew Hertz	Y
CON - 1	CA Department of Conservation	Farmland Mapping and Monitoring	J. Santill	
CRA - 1	CA Resources Agency	Legacy Project	Mike Byrne	
CRA - 2	CA Resources Agency, Dept. of Conservation	Office of Mine Reclamation, Abandoned Mine Lands	Sam Hayashi	
CRA - 3			Matt Price	Y
DFG - 1	CA Department of Fish and Game	Lands and Facilities Branch	Craig Turner	
DFG - 2	CA Department of Fish and Game	Information Services Branch, Wildlife Mgmt.	Linda Miller	
DFG - 3	CA Department of Fish and Game	Habitat Conservation	Tracy Love	
DFG - 4	CA Department of Fish and Game	Region 3 Wildlife Management	Jeannine DeWald	
DFG - 5	CA Department of Fish and Game	San Joaquin Valley / S. Sierra Region	Jeffrey R. Single	Y
DFG - 6	CA Department of Fish and Game	Fresno	Paul Brandy	Y
DPR - 1	CA Department of Pesticide Regulation		Dean Chiang Rosemary Neal	
DWR - 1	CA Department of Water Resources	Environmental Services	Harry Spanglet	
DWR - 2	CA Department of Water Resources	Delta Levees	Joel Dudas	
DWR - 3	CA Department of Water Resources	Statewide Planning	Greg Smith	
HCD - 1	Dept. of Housing and Community Development		Paul Dirksen Jr.	Y
OES - 1	Governor's Office of Emergency Services	Hazard Mitigation Program	Randy Fortner	Y
OES - 2	Governor's Office of Emergency Services		David Kehrlein	Y
RWQ - 1	RWQCB - Central Valley		Bob Matteali	
RWQ - 2	RWQCB - Central Valley	San Joaquin TMDL Program	Diane Beaulaurien	
RWQ - 3	RWQCB - North Coast		Rebecca Fitzgerald	Y
RWQ - 4	RWQCB - North Coast	Cleanups & Special Investigations Unit	Stephen Bargsten	Y

TABLE B1: PROGRAMS PARTICIPATING IN DLRI REQUIREMENTS

Survey ID	Agency	Program	Participant	Interview
RWQ - 5	RWQCB - Central Coast	TMDLs	Mark Angelo	Y
RWQ - 6	RWQCB - Lahontan	South Lake Tahoe office	Anne Sutherland	Y
SCC - 1	State Coastal Conservancy		Jamie Schmidt	
SLC - 1	California State Lands Commission	Boundary Unit	Kelly Olin	Y
SLC - 2	California State Lands Commission	Compliance Program	Tim Lipscomb	Y
SLC - 3	California State Lands Commission	School Lands	Bruce Crandall	Y
SLC - 4	California State Lands Commission		Donald B. Fruechtl, MAI	Y
SLC - 5	California State Lands Commission	Title	Jeff Kato	Y
SLC - 6	California State Lands Commission	Mineral Resources Management Division	Greg Pelka	Y
UCD - 1	University of California Davis	Information Center for the Environment	Dave Shpak	Y
UCD - 1	University of California Davis	Information Center for the Environment	Mike Byrne	Y
UFW - 1	U.S. Fish and Wildlife Service		Tony McKinney	Y
USD - 1	Federal Agency-USDA	Natural Resources Conservation Service	Susan Southard	Y

Table B2 presents DLRI requirements for defined business functions supported by DLRI. Each business function is referenced to the program in Table B1 by the Survey ID.

Numeric values represent the relative need for DLRI content information using a scale of 1-10 where 1 is low and 10 is high. Benefits of the DLRI are listed for each business function.

TABLE B2: DLRI NEEDS BY BUSINESS FUNCTION

Survey ID	Function ID	Business Functions Supported by DLRI	Mandated Program	Scanned Assessor Map Pages	Assessor Property Characteristics	Parcel Boundaries	Assessor Building Characteristics	City and County Boundaries	Major Public Land Owner	Township/Range/Section	Flood Zone	Standard General Plan Land Use	Standardized Zoning	Business Locations	Building Plans / Floor Plans	Site Plans	Building Footprints	Quarterly Parcel Update	Enhanced Accuracy	Benefits from having the identified DLRI data available
ARB - 1	1	Statewide Cumulative Risk Modeling and Mapping (PTSD)		2	2	4	8	8	7	6	2	8	8	10	10	10	10	1	2	Greater spatial resolution and hence accuracy in statewide cumulative toxic risk assessment, resulting in better land use/siting decisions, environmental justice assessment and public health protection.
ARB - 1	2	Emission Inventory Development (PTSD)		2	2	4	8	8	7	8	2	8	8	10	10	10	10	1	2	Greater spatial resolution and accuracy in emission inventories, needed for air quality modeling and attainment strategies.
ARB - 1	3	Improvement to Air Quality Models (PTSD)		2	2	4	8	8	7	6	2	8	8	10	10	10	10	1	2	Detailed parcel data will support improved air quality model algorithms.
ARB - 1	4	Diesel Risk from Distribution Centers/Transport Refrigeration (PTSD)		2	2	6	6	8	7	6	1	8	10	10	9	9	9	1	4	Consistent spatially resolved parcel data, building footprints, site plans and business name and type would significantly facilitate work being done to improve statewide emission contributions for distribution centers.
ARB - 1	5	Improved Pesticides Emission Inventory (PTSD)		2	2	6	4	8	7	9	1	8	9	8	5	5	6	1	2	Land use type and business location information that specifies crop type and acreage would be useful. Bridging a link between a PUR database location field and the more resolved parcel polygons would be ideal.
ARB - 2	6	Toxic Air Contaminant Identification and Control Program (SSD)	X	2	2	4	8	8	7	7	2	8	8	10	10	10	10	1	1	Easy access to building and parcel information will enhance our analysis accuracy and efficiency and improve public health protection.
ARB - 3	7	Proximity Research of Vulnerable Populations (RD)		2	2	4	8	8	7	6	2	10	10	10	8	8	8	1	4	Knowing the location of residential (receptor) and emission sources will allow researchers to investigate more accurately the links between the health of vulnerable populations and exposure.
ARB - 3	8	Support Research for Ambient Air Criteria Standards (RD)	X	2	2	4	8	8	7	6	2	10	10	10	8	8	8	1	4	Linkages between health and exposure at a more refined level will allow us to ensure that our standards are health protective.
BLM - 1	9	Land and Sub-Surface Management	X	3	10	10		9	9	5	5	5						9	10	Standardized data will allow BLM to detect parcel ownership error and take appropriate steps. Also ensures that Counties receive property rights when purchasing Federal Lands.
BLM - 1	10	Master Title Plans	X		10	10		6	8	8								9	10	Provides more accurate information for property indexing and analytical queries.

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BLM - 1	11	Legal Description Database Maintenance	X		10					10								9		Allow the BLM to keep the PLSS database current and consistent and save money by reducing litigation on land ownership disputes.
BLM - 1	12	Island Detection and Consolidation			10	10		5	5									9	10	Facilitates the increased usability of properties through consolidation.
BLM - 1	13	Federal Government Requests		3	10	10		8	8	5	5	5						9	10	Improves the speed and accuracy of response to requests.
BOE - 1	14	Determine Tax Rate Areas	X	5	10	10	5	10	7		5	7	7					10	10	Increases the efficiency of analysis for revenue allocation.
BOE - 1	15	Tax Rate Area Mapping	X	5	5	8		10										5	10	Reduce the cost to subscribers by increasing the efficiency of delineating TRAs.
BOE - 1	16	Blueline Chart Maintenance		3	5			5										5		Improve the quality of the database and increase the efficiency of maintenance.
BOE - 1	17	Jurisdictional Boundary Updates	X		5	8		10	5									5	10	Improve the accuracy and timeliness of updates to the TRA alignments.
BOE - 1	18	State Assessed Property Management	X	3	10	8		8	10									10	10	Allows spatial analysis of State assessed properties and the timely submittal of statements regarding properties affected by railroads and utilities.
CAL - 1	19	Land Acquisition Analysis – Review of Local General Plan/Housing Plan	X		10	10	7	5	8		5	10	10					10	8	
CDF - 1	20	Timber Harvest Plan GIS Data Capture	X			10		6	8	6									8	Accurate parcel boundaries in GIS format will increase the accuracy of timber harvest plan boundary captured by our GIS staff and increase the efficiency of the data capture process.
CDF - 2	21	Watershed Assessment & Planning		3	3	10	8	6	8	6	7	8						4	5	Useful for land use planning and economic analysis.
CDF - 3	22	Assessment of Forest & Range Condition/Trends	X	4	10			3	10			7	7							Higher quality land ownership/land use data will support a more accurate assessment of forest and range condition and trends
CDF - 3	23	Vegetation Mapping & Monitoring/Development Footprint	X	3		10		3	5				5				8			Parcel data could assist in mapping "urban" areas and analyzing landscape changes due to development
CDF - 3	24	Strategic Decision Support		1	6	10		8	10			2	4				2			Better decision making on a variety of strategic issues such as facility relocations
CDF - 3	25	State Responsibility Area (SRA) Mapping & Fees Analysis	X	3	7	10		10	10											Would eliminate about 1500 staff hours (field Units and HQ) in tracking changes in ownership and city boundaries
CDF - 3	26	Mapping Wildland Urban Interface				10			8				5				4			More accurate mapping of areas at highest risk to housing damage could help us target resources more effectively to save lives, property and suppression costs

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CDF - 3	27	Development/Growth Modeling		3	3	10		10	10		10	10	10			10	10			More accurate forecasts of growth patterns will assist in developing strategies for habitat conservation, resource protection, provision of emergency services
CDF - 3	28	Analysis of Timber Industry	X		2	8			10			6	4							Provides capability to spatially locate industrial timberlands and analyze trends in timberland base and wood production
CDF - 3	29	Analysis of Range Livestock Industry	X		2	8			10			6	4							Provides improved capability to locate rangelands used for livestock production and analyze trends in the land base and production
CDF - 4	30	Watershed Assessment		3	3	10	8	8	8		8	8	5					4	5	
CDF - 5	31	State Property Boundary Mapping	X	5	10	10	3	5	8	5								8	5	
CDF - 6	32	Pre-Fire Planning and Fuels Reduction	X		5	8	5	5	8	5		8					5	3	3	Reduction of the personnel hours required for pre-planning by up to two thirds.
CDF - 6	33	Identify Assets in the Path of Wildfires	X		8	8	8	5	8			8	8	7		5	5	3	3	Reduction in costs and losses due to an emergency incident.
CHP - 1	34	Computer Aided Dispatching – 911, etc			8			9	6											Accurate boundaries allow determination of allied agencies; Situs address allows dispatch to correct location.
CHP - 1	35	Crime Analysis			8			7	2			3	3							Situs & jurisdiction information identifies affected parcels involve in crime
CHP - 1	36	Law Enforcement			7			10	8			6	6							Boundaries assist in the re-alignment of patrol beats and services.
CHP - 1	37	Hazardous Materials Routing			8			5				6	6							Location/monitoring of hazmat sources need ownership/situs info; jurisdiction boundaries; pop density in gen plan info is necessary in analysis.
CHP - 1	38	Dignitary Protection						8												Jurisdiction boundaries provide allied agency information
CHP - 1	39	Traffic Accident Analysis						7				8	8							Land Zoning/Use pattern assist in traffic accident analysis
CHS - 1	40	Cancer Patient Registry	X		3	5		5										5		Geo-coding will increase speed and accuracy of patient database creation.
CHS - 1	41	Parcel Data for Cancer Cases	X		10	10		5				5	5					8		Improved research from a more accurate and easily accessible data source.
CHS - 1	42	Pesticide Usage Mapping			8	7		5	5		5	7	7	7				5		Improved analytical capabilities.
CHS - 1	43	Cancer Case Demographic Analysis			3	7						3								Improved analytical capabilities.
CHS - 1	44	Pollutant and Hydrology Mapping			8	8					10	10								Improved analytical capabilities.
CON - 1	45	Agricultural Easements Parcel Search		10	10	10		5	10			10	10							Locate agricultural easements/Williamson Act land
CON - 1	46	Abandoned Mines & Well Locations		10	10	10		5	10			5	5							Indexes enable location of book & page info

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CON - 1	47	Farmland Mapping & Monitoring		10	10	5		5	10			10	10							When looking at aerial photos to determine land use, it would be useful to look up the parcel where it is difficult to determine the use in the photo.
CRA - 1	48	Conservation and Priority Acquisition Planning		1	6	9	1	8	10	6	7	8	8	1	1	1	1	4		We are working with departments authorized to allocate prop.12, 13, 40 and 50 funds for acquiring new conservation lands. In our strategic approach, knowing the parcels in current use greatly enhances the potential for acquiring the best pieces given the limited budget.
CRA - 2	49	Parcel Ownership Contact for Access to Abandoned Mines	X	5	10	10			5	5		3						3	5	GIS parcel basemap and ownership information will increase our speed and accuracy in contacting parcel owners. This will be used to ask permission to access land and roads that pertain to known abandoned mines for inventorying purposes.
CRA - 3	50	Statewide Digital Atlas	X		10	10		8	10			10	10					10		Potential 40 percent reduction in GIS staff effort.
DFG - 1	51	Map Current/Future DFG Owned/Administered Lands	X	2	2	10		8	8	9		3						4	9	Will enable greater accuracy with boundary delineation.
DFG - 1	52	Weed Abatement/Land Management/Prescribed Burning		2	5	5		5	5	4		6						1	1	Will allow adjacent landowners to be notified/coordinated with.
DFG - 1	53	Hunting Boundaries/Property Line Issues		2	2	10	1	5	4	3		4						1	1	Make determining legal boundaries/hunting boundaries easier.
DFG - 1	54	Conservation Planning	X	2	8	8	2	9	9	9		9						5	6	Will allow for better future conservation planning efforts
DFG - 2	55	Land Acquisition	X	5	5	10		4	8	10	8	7	7					8	3	GIS parcel data allows us to overlay parcels with existing natural resource data to evaluate impacts of acquisitions; accurate and current attribute data is imperative.
DFG - 2	56	Obtaining Permission for Access to Private Parcels for Resource Surveys and Monitoring	X	5	5	10		2	8	10								8	3	Having statewide parcel GIS would greatly improve efficiency and eliminate many hours of obtaining and reformatting varying county datasets. Del Norte County does not even have a digital (GIS) parcel database.
DFG - 2	57	Contact Landowners for Obtaining and Disseminating Resource Information		2	2	9					5	7	7					10		GIS parcel data allows us to overlay parcels with existing natural resource data; having up-to-date assessor property attributes is imperative for being able to contact the proper individuals.
DFG - 3	58	Regulation																		
DFG - 3	59	Land Acquisition																		
DFG - 3	60	Land Management																		
DFG - 3	61	Habitat Identification																		

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DFG - 4	62	Preparing Land Acquisition Proposals		4	4	9		7	4			5	5							
DFG - 4	63	Planning Broader-Scale Habitat Protection		2	4	9		7	9			4	4							
DFG - 4	64	Tracking Lands in Public Ownership		1	3	8		5	10			2	2							Existing data contains many inaccuracies
DFG - 4	65	Keeping Track of Conservation Easements, etc.		2	3	6		5	1											This data may not exist at the parcel map level
DFG - 4	66	Notification of Interested Public on Various Issues		2	10	10														
DFG - 5	67	Streambed Alteration Agreements		3	10	10		8	8	5	8	5								
DFG - 5	68	Timber Harvest Plan Review				10		6	8	6		6								8	
DPR-1	69	Identify fields for pesticide use, registration, permitting statewide coverage of Ag fields (Needs = 9) Comment: coverage in unincorporated, non-urban areas important.			9	9			8	7		8	8							Contribute to pesticide use mapping, automated permitting and risk analysis, etc.
DWR - 1	70	Analyze Project Impacts of a Project on Agricultural and Conservation Resources -Required by CEQA		3	10	10	2	4	10	4	8								10	9	CEQA requires an analysis of land-use changes (Land Evaluation And Site Assessment Model) based on parcels falling within a certain distance of project, which are needed in GIS to overlay biol. resources.
DWR - 1	71	Requesting Entry Permits to Parcels for Biol. Surveys		3	9	10	6	7	8	8									10		Information on parcel owners and contact info will help target parcels for which we need entry and avoid entry permits that are not in project area.
DWR - 1	72	Identifying Potential Restoration/Mitigation Sites			9	10	5	2	9	7	10									10	Overlaying parcels with biol. info will allow identification of parcels that meet our criteria and can be targeted for acquisition.
DWR - 2	73	Project Site Assessment, Comparative	X	4	4	7	7	1	7	1	5	4	1	1	1	3	1	6	9	Compare different potential project sites
DWR - 2	74	Maintain Currency of Info about Landowners Adjacent to Program Properties/Activities		1	2	4	3	1	1	1	1	1	1	1	1	3	1	7	10	Analyze/assess costs & issues for projects
DWR - 2	75	Emergency Response (flood fights)	X	2	2	6	7	3	2	1	7	1	1	1	1	5	3	7	9	Notify landowners/compare levee
DWR - 2	76	Assess Levee Encroachment Removal Costs		2	3	4	9	1	1	1	1	3	1	1	4	5	8	2	6	Project cost & design
DWR - 2	77	Identify Borrow Material Value		4	5	4	1	1	4	1	3	1	1	1	1	2	1	3	3	Project cost & design
DWR - 3	78	Land Use Planning			8			8	9												Could save about 1 year if provided easy to use query & consistent
DWR - 3	79	Water Demand Forecasting			10	10		10	10												Could save about 1 year if provided easy to use query & consistent
DWR - 3	80	State-Regional-Local Water Planning Coordinated			10	10		10	10												Could probably reduce future BCPs for coordinated water planning, Dollars unknown.
HCD - 1	81	Review of Local General Plan/Housing Plan	X		3	10		10				5	8	8				9		Provide a common base for analysis that can reduce the need for site visits and improve the regulation of affordable housing plans and funding opportunities.

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HCD - 1	82	Site Assessment for Housing Loan and Grant Programs			8	10	5	8			8	6	8	7				10		Provides method to avoid site visits and conduct initial screening for housing sites.
HCD - 1	83	California Loan and Grant Programs	X		5	10	5	8				8	8	8						Mapping existing affordable housing projects.
OES - 1	84	State Operations Center and Regional Emergency Operations Centers	X		10	10	10	8			10	6	6			8	10	10		Improve response to disasters based on more accurate and readily available information.
OES - 1	85	Risk Analysis	X		10	10	5	8			10	6	6			8	10	10		Potential time savings of 90 percent for research.
OES - 1	86	Resource Allocation	X		10	10	6	8				6	6			8	10	10		Facilitate planning efforts by providing consistent, more complete and more accurate data
RWQ - 1	87	Track Pesticide Use by Field Location	X	3	10	10	3	4	3	10	5									
RWQ - 1	88	Salt & Boron Basin Plan Amendment	X	10	10	10	3	3	7	10	6									
RWQ - 1	89	Identify & Track Discharger Ownership - Dairies	X	10	10	10	10	10	5	10	10	10	10	5	3	2	3	10	10	GIS parcel basemaps and ownership will increase speed and accuracy of determining responsible parties for discharge requirements and illegal discharges
RWQ - 2	90	Track Pesticide Use by Field Location	X	3	10	10	3	4	8	10	5							10	10	
RWQ - 2	91	Salt & Boron Basin Plan Amendment	X	10	10	10	3	3	7	10	6									
RWQ - 3	92	Development of TMDLs	X		10	10						8	10	10						Standardized processes and common data sets will help RWQCB meet NPDES requirements.
RWQ - 3	93	Locating Timber Harvesting Plans	X		10	10		8	10			5	5							Standardized processes and common data sets will help RWQCB analyze timber harvesting locations.
RWQ - 3	94	Producing Notification Lists	X		10	10			5									10		More accurate and complete data will make the process faster and easier for staff.
RWQ - 3	95	Permit Tracking			10	10			5									10		Standardized processes and common data sets will make the tracking process more efficient.
RWQ - 3	96	Complaint/Spill Response			10	10						5	5	5						Provide faster response with reduced staff effort.
RWQ - 3	97	Regulatory Program Participation Tracking			10	10			5					8				10		More accurate and complete data will make the process faster and easier for staff.
RWQ - 3	98	Leak Identification			10	10			5		3	5	5	5		8				More accurate and complete data will facilitate location and analysis of leaks.
RWQ - 3	99	Identify Areas of High Septic System Use			10	10						5	5			8				More accurate and complete data will facilitate location and analysis of septic systems.
RWQ - 3	100	Identify Property Size and Configuration			10	10														Provide easy and immediate access to parcel information including size and configuration.

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SCC - 1	101	Acquisition of coastal properties for public access, habitat preservation and other agency goals.		5	5	5		5	4			5	5							Accurate parcel boundaries in GIS format would improve efficiency of planning on both a regional and project specific basis. The Coastal Conservancy currently has parcel data for many of the coastal counties. Most of this data was obtained through special license agreements and cannot be used with other agencies. We still need parcel data for the 9 Bay Area Counties and Southern California area. In addition, we do not have a long-term plan for keeping the parcel data that we have up-to-date, so that would also be helpful.
SCC - 1	102	Developing Coastal Access Ways (trails, etc.)		4	5	5		4	3			4	4							Accurate parcel boundaries in GIS format would improve efficiency of planning on both a regional and project specific basis.
SCC - 1	103	Developing Habitat Restoration Projects and Priorities		3	4	4		4	4			5	5							Accurate parcel boundaries in GIS format would improve efficiency of planning on both a regional and project specific basis.
SCC - 1	104	Mailing Notifications to Neighbors of Projects		3	6															Accurate parcel boundaries in GIS format would improve efficiency of planning on both a regional and project specific basis.
SLC - 1	105	State Topographic Quad Sheet Mapping		10		10		5												Savings on staff time by using photos to reduce the need for site inspections.
SLC - 1	106	Property Inventory Database	X	10	8													10		Make database maintenance more efficient and provide more timely and accurate information.
SLC - 1	107	Property Inspection Database	X	10	5													10		Make database maintenance more efficient and provide more timely and accurate information.
SLC - 6	108	Manage Mineral Resources of State Lands	X	7	7	7	7	2	8	10	3	7	7	5				1	8	Provide greater efficiency and help generate more revenue through better management of State lands.
UCD - 1	109	Partnership for Integrated Planning		10	10			8	10			10	10					5		
UCD - 1	110	CalTrans Project Study Report Data Review System		10	10			8	8	5	5	10	10					5	5	
UCD - 1	111	California High Speed Rail Program		10	10			10	8			7	7					5	8	
UFW - 1	112	Critical Habitat Mapping			6	6		6												Access to parcel information in non-urban areas.
UFW - 1	113	Manage Fish and Wildlife Resources	X	1	5	8	3	10	10	10	8	8	8	2	1	5	2	10	9	Aids in ability to plan for management and protection of fish and wildlife.
USD - 1	114	Soils Mapping				8														Improved efficiency.
USD - 1	115	Tracking Land Transfers			10	10			6									4		Improved efficiency.
		Total Score		207	721	857	209	558	572	306	234	464	394	138	83	151	155	386	280	
		Count		57	104	101	38	87	81	46	43	72	61	23	16	23	25	62	44	
		Average		4	7	8	6	6	7	7	5	6	6	6	5	7	6	6	6	
		Total Score Rank		12	2	1	11	4	3	8	10	5	6	15	16	14	13	7	9	

Appendix C:
Availability of Digital Land Records from California Counties

Introduction
The State of California has undertaken an effort to identify the requirements, benefits and strategies for implementing a standardized statewide source of Digital Land Records Information (DLRI) capable of supporting the diverse needs of all State agencies. The strategic element of the project includes a survey of the California counties to determine the existence, condition and availability of GIS parcel basemap data and the feasibility of developing of a statewide parcel basemap.

Each county in the State was contacted about the existence of GIS data. When a county indicated that they maintained a GIS, they were asked about the format, level of accuracy, completeness and frequency of updates. The survey also inquired about the cost to obtain the GIS parcel basemap and tax roll data.

Additional questions focused on data layers that could be related to a GIS basemap such as jurisdictional boundaries, building outlines, zoning and environmental data. The respondents were also asked about the availability and costs of scanned images of the assessor pages.

The goal of the report is to present an overview of the county responses and a synopsis of the availability of GIS parcel basemap data throughout the State of California. The report is structured to so that the sections/headings correspond to the questions in the survey.

Survey Results
The 58 counties in the State of California were surveyed to determine the availability of GIS parcel data to support state government functions. The survey covered the following aspects of county maintained GIS data:

- The existence and availability of GIS parcel data

- The format of the data

- The positional accuracy of the data

- The currency of the data

- Standard data use agreement and pricing for parcel data

- Cost for the annual tax roll

- Monthly updates for ownership information

- The availability and frequency of update of Assessor's page digital images

- The availability and cost of overlay data sets maintained by the counties

The results of the survey are summarized in the following report.

Is a GIS Parcel Basemap Available?

Each county was asked if they maintained a GIS parcel basemap. To accommodate agencies using CAD for mapping purposes, the qualifications for a GIS basemap are; the parcels are on a geographic coordinate system and the parcels can be related to attribute data, specifically the Assessor's roll.

Of the fifty-eight counties in California eighty-eight percent, or fifty-one counties, responded that they have a GIS parcel basemap available. Ten of these counties describe their basemap as available but still in progress (some portion of the county is complete). The counties that did not have GIS indicated plans to implement GIS in the near term.

The level of basemap completion is variable. Thirty-eight of the counties report their basemap as completely mapped, four have ninety percent or more of their mapping completed, two others have seventy-five percent or more done and four counties reported their basemap completion as less than seventy-five percent. Eight counties did not report a percentage of completeness for their basemap.
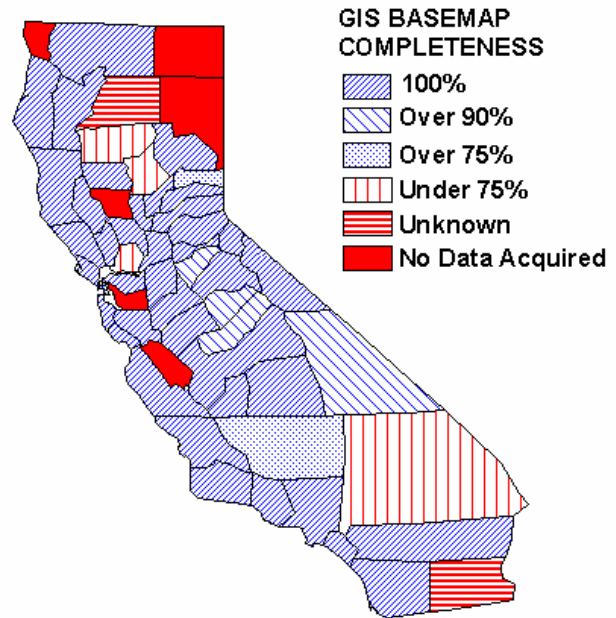
Level of Completeness

100%	Over 90%	Over 75%	Under 75%	Unknown
40	4	2	4	2

What is the Format of the GIS Parcel Basemap?

All counties except two have either GIS or CAD capabilities. Most counties use CAD to create the individual Assessor's map pages. ESRI products are the predominant formats for county parcel GIS data. Of the respondents with a GIS, shapefile, Arc/Info coverage, Geodatabase and the Spatial Data Engine comprise eighty-four percent of the digital formats in use.

GIS Data Format

ESRI Arc/Info	ACAD	GDS	Intergraph	Hardcopy
47	6	1	2	2

The table above shows a breakdown of the parcel formats in the fifty-eight counties. The graphic on the right shows GIS format by county.

A statewide representation of parcels must be stored in a common GIS data format to efficiently support diverse application needs. Procedure and tools are needed to transfer data from each of the counties into a common statewide standard format to facilitate multi-county processing.

 Counties primarily rely on CD-ROM and DVD to transfer data but several of the counties use tapes (cartridge and reel) to distribute data. Shapefiles may be used as a common data format for data transfer.
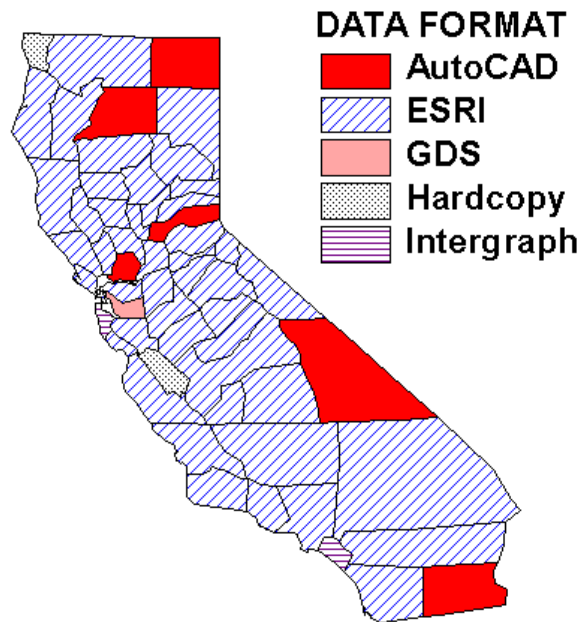
What is the Positional Accuracy of the GIS Parcel Basemap?

Counties typically described their parcel accuracy in two levels, one for urbanized areas and the other for rural areas. Thirty-one of the counties reported the positional accuracy of their parcels as closer than +/- 10 in the urban areas and thirteen other counties reported an accuracy of +/- 50 or better.

Each of the counties has mapped their respective parcels using techniques and specifications that address their agency's mapping requirements. There is no uniform level

of positional accuracy as each county's requirements and resources determine the level of basemap accuracy.

The table that follows describes the results of the accuracy survey. The listed factors are:

- The positional accuracy for urban areas is categorized as: 10 feet or closer, between 10 and 50 feet and more than 50 feet.

- The positional accuracy for rural areas is categorized as: 100 feet or closer, between 100 and 200 feet and more than 200 feet.

- Seventeen of the counties have a uniform level of accuracy and have no value in the rural categories.

- If the accuracy was expressed in scale, the National Map Accuracy standards were used to categorize the positional accuracy.

- Five of the counties that maintain a GIS basemap are non-responsive regarding positional accuracy.

The table below shows the number of counties that reported each category of accuracy.

Parcel Positional Accuracy in Feet

Urban Areas				Rural Areas			
1 to 10	**10 to 50**	**Over 50**	**Unknown**	**1 to 100**	**100 to 200**	**Over 200**	**Unknown**
31	13	1	6	39	2	2	8

What is the Currency of the GIS Parcel Basemap?

Currency represents the time lag between updating assessor maps with parcel changes and those changes being incorporated within the GIS parcel basemap. Most of the counties have GIS data maintenance schedules and make updates within one month of changes made to the assessor maps. Twenty-three of the counties report their parcel basemap as current to within one month, nine counties have a backlog of 3 to 6 months and fourteen counties indicate a backlog of a year or more.

Update frequency represents how often county staff perform updates to the GIS basemap. Twenty-six of the counties perform updates to the data at least monthly, eighteen are quarterly or semi-annually and eight counties are either annually or lack a defined schedule.

The table that follows shows the currency of the parcels maintained by the counties and the frequency of data updates. The table lists the number of counties that reported in each heading.

Data Currency

Within 1 Month	Up to 3 Month	Up to 6 Month	Over 1 Year	Unknown
23	5	4	14	5

Update Frequency

Daily	Weekly	Monthly	Quarterly or Semi Annual	Annually or undefined
11	5	9	18	8

Quality of Available GIS Parcel Basemap

GIS parcel data was collected from most counties to support a State mapping project. Whenever the data was free or a nominal charge, the entire county was acquired. High costs for data acquisition limited the parcel data obtained to limited areas where the required for the mapping project. The parcel GIS data was analyzed for various characteristics to better understand its quality and utility. Findings are presented in the Table 13 Detailed Parcel Findings on page 69.

GIS Parcel Match Rate to APN

The GIS parcel files were matched to current Assessor role files using Assessor Parcel Number (APN). This test provides an indication of consistency between the GIS and assessor role, and the currency of GIS parcels. Most GIS applications of parcel data require high currency and consistency with assessor role files.

GIS Parcel Match Rate to APN: Number of Counties

No GIS	Unverified	90 to 98%	Above 98%	Total # of Counties
6	17	25	10	58

Ten counties (17%) maintain GIS basemap with match rate above ninety-eight percent which is very high considering update processes for GIS and role files are separate

workflows. Twenty five counties (43%) maintain GIS basemap with match rate above ninety percent.

Is There a Standard Data Use Agreement for the GIS Parcel Basemap?

A Standard Data Use Agreement defines the roles and responsibilities of both the data provider and the data user and defines the cost structure. Twenty-five of the counties currently have an agreement for GIS data use. Most of those without an agreement are in the process of developing one. The graphic shows the counties with GIS data use agreements.

Fifty of the counties provided pricing information, thirty-one of which charge nothing to government agencies. There are eight counties with pricing of $3,000 or greater. The average cost for data, excluding those at no cost and those over $3,000, is approximately $360 per county.

DATA AGREEMENTS
No Agreement
Not Applicable
Unknown
Existing Agreement

Many of the counties are interested in negotiating the release of their data, preferably in exchange for other data sets. Los Angeles and Orange counties required negotiation as they generate revenue from their parcel basemaps through re-sell agreements.
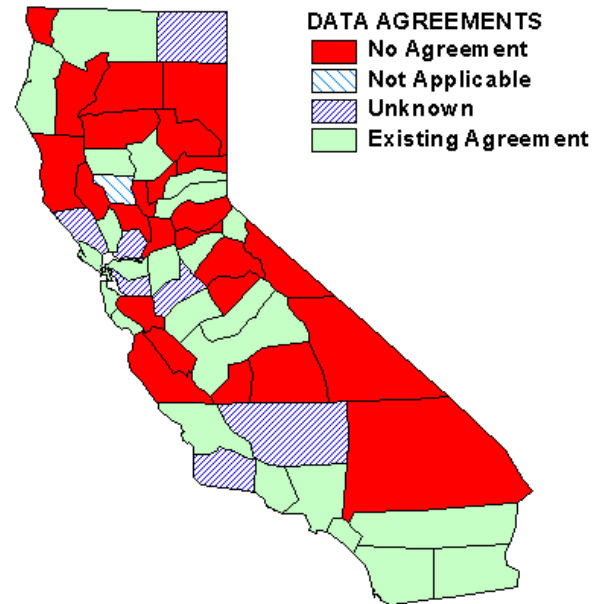
What is the Cost to Obtain a Digital Copy of the Annual Tax Roll?

Forty-six of the fifty-eight counties responded with a cost for their annual tax roll. Five counties charge nothing for their files, but five of the responses indicate prices greater than $3,000. San Francisco County quoted a price of $25,000 for the secured annual tax roll, Contra Costa, San Diego and Ventura all quoted pricing in excess of $10,000 for their tax rolls.

The average cost of the annual tax roll for the thirty-six counties responding with a price greater than zero and less than $3,000 is $580.

Are Updates to Owner Information and New Parcels Available Monthly?

Thirty-four of the respondents make their updates available on a monthly basis. Many are distributed as part of a subscription agreement or are provide by a service such as DataQuick, First American or Metroscan.

Are Individual Pages and Index Sheets Available as Digital Images?

Forty-five of the counties indicate the Assessor's pages are available as digital images and most state that the map page updates are provided on a monthly basis. The majority of the counties make their pages available through a service such as First American, DataQuick or Metroscan. CD Data distributes the largest share of the counties and was referenced by 21 of the respondents.

The graphic on the right shows the counties that have digital images of Assessor's pages.
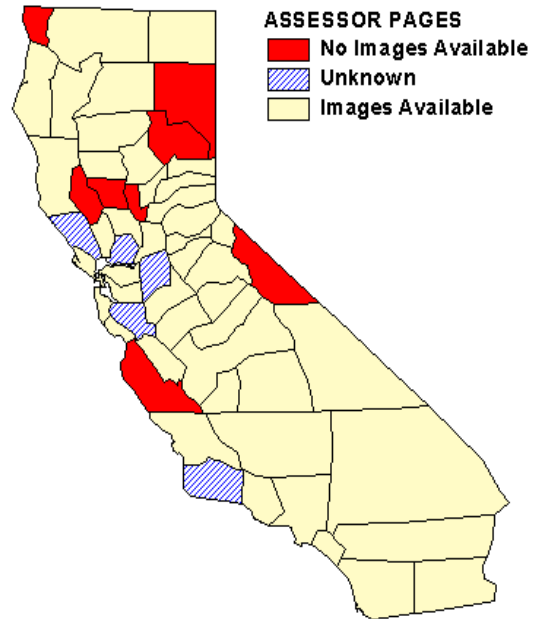
### *What is the Availability of Overlay GIS Data?*

The counties were asked if the following data sets were available: Building Outlines, City and County Boundaries, Flood Zone, General Plan Land Use, Township Range and Section and Zoning. The counties were also asked how those data aligned with the parcel basemap and what costs, if any, are associated with the data.

Most counties have some data available through Planning or Public Works and the alignment of most data is generally coincident with the parcels. Counties tend to use FEMA digital flood maps that are not coincident with parcels in most instances due to different mapping scales and standards.

The data costs are either unknown or negotiable, as the counties have not established a pricing structure for distributing this data. Sixteen of the counties do not charge for the additional data sets. City and County Boundaries are typically included with the parcel data.

The following table shows the number of counties that have overlay data available.

County Overlay Data Availability

Building Outlines	City and County Boundary	Flood Zone	General Plan Land Use	Township Range Section	Zoning
3	50	39	38	44	42

Findings

There is a considerable amount of GIS parcel data available throughout the state. A major finding is that all counties have either a completed digital parcel basemap, are in the process of completing one, or at least have implementation plans for the near future.

The usability of this data as an aggregated statewide GIS parcel basemap is feasible but further analysis of the actual data is needed. The statewide basemap can serve most identified needs with a mosaic of county level GIS parcel basemaps if some common format, content and metadata are assured. Gaps in data coverage and variations in mapping accuracy, currency and data structures require the development of mitigation strategies to maximize usability by the State.

The county GIS parcel basemap, standards and procedures are evolving and improving. The statewide strategy for developing a GIS basemap mosaic should not consider the current state of parcels as static, but should look for opportunities to collaborate with counties to enhance the county data and processes that would result in greater uniformity across the state.

An additional challenge will be to develop joint use agreements between counties and the state and implement coordinated data updating processes. Pricing variations are a significant problem, reflecting very different local attitudes for data sharing versus cost recovery.

Table 6 Detailed Parcel Findings

County	GIS Basemap Available	Native GIS Format	Estimated High Positional Accuracy	Nature or Percentage of High Accuracy	Estimated Low Positional Accuracy	Nature or Percentage of Low Accuracy	Level of GIS Currency	Update Frequency	Percent of Mapping Completed	GIS Parcel Match Rate to APN*	Existing Data Use Agreement	GIS Parcel Cost	Assessor Roll Data Cost	Ownership Updates Available Monthly	Assessor Page Images Available Monthly	Assessor Page Updates Available Monthly	Building Outline Price	City and County Boundary Price	Flood Zone Price	General Plan Price	Township Range Price	Zoning Price
Alameda	N	GDS	0.02	20%			1 Month	Monthly	20	No GIS					Y	Y						
Alpine	Y	Shapefile	3	Urban	20ft	Rural	Annual	Quarterly	100	Unverified	Y	$ 650	$ 300	N	Y	N	$ 100			$ 100	$ 100	$ 100
Amador	Y	Shapefile	50		100		1 Month	Monthly	100	Unverified	N	$ -	$ 500	Y	Y	Y	$ -	$ -	$ -			$ -
Butte	Y	Coverage			40ft		Annual	Quarterly	60	91%	Y	$ 200	$ 500	N	Y	Y		Avail	Avail	Avail	Avail	Avail
Calaveras	Y	Shapefile	3	100%				Quarterly	90	Unverified	Y	$ -	$ 875	Y	Y	Y		$ -	$ -	Avail	$ -	Avail
Colusa	N	Shapefile	20	10%	200ft	90%		Opportunity	100	No GIS	N/A	$ -	$ 100	N	N	N						
Contra Costa	Y	Coverage	2	Varies	10ft	Varies	Semi-Annual	Quarterly	100	96%	Y	$ -	$ 10,000	Y	Y	Y		Avail	Avail		Avail	Avail
Del Norte	N	Hardcopy							0	No GIS	N		$ 600	N	N	N						
El Dorado	Y	Shapefile	40	South		North	1 Week	Weekly	100	Unverified	N	$ 64	$ 700	Y	Y			Avail		Avail	Avail	Avail
Fresno	Y	Coverage	1	40%	20ft	10%	3 Month	Daily	100	94%	Y	$ 1,731		Y	Y	Y		$ -	$ -	$ -	$ -	$ -
Glenn	Y	Coverage	Close	100%			Annual	Quarterly	100	91%	Y	$ 40		N	Y	Y		Avail		Avail	Avail	Avail
Humboldt	Y	Shapefile	5	Urban	400ft	Rural	Annual	Semi-Annual	100	93%	Y	$ 500		N	Y	Y		Avail	Avail		Avail	Avail
Imperial	Y	AutoCAD	1m	100%			Annual	Daily		Unverified	Y	$.05/Parcel	$.03/Parcel	Y	Y	Y		Avail	Avail		Avail	Avail
Inyo	Y	AutoCAD	5	90%		10%	Annual	2 Month	90	97%	N	$ -	$ 385	Y	Y	Y		Avail				Avail
Kern	Y	Shapefile					Annual	3 Month	80	100%		$ -	$ 80		Y	Y		Avail	Avail	Avail	0	Avail
Kings	Y	Shapefile	Close	100%			Annual	Annual	100	Unverified	N	$ 5,000	$ 1,300	N	Y	N		Avail	Avail	Avail	Avail	Avail
Lake	Y	GDB	2	Urban	50ft	Rural	1 Month	Daily	100	95%	N	$ -	$ 25	Y	N	Y		Avail	Avail	Avail	Avail	Avail
Lassen	Y	Shapefile	300	100%			Annual		100	97%	N	$ -	$ 375	N	N	N						
Los Angeles	Y	GDB	5	100%			1 Month	Daily	100	Unverified**	Y	$.20/Parcel	$ 2,300	Y	Y	Y		$ -		$ -	$ -	
Madera	Y	Shapefile	30	100%			1 Month	Daily	90	91%	Y	$ -		Y	Y	N		Avail		Avail	Avail	Avail
Marin	Y	Shapefile	5	Urban	1200 scale	Rural	Semi-Annual	Semi-Annual	100	98%	Y	$ -	$ 250	Y	Y	Y		$ -	$ -	$ -	$ -	$ -
Mariposa	Y	Shapefile	2	100%			Annual	Quarterly	90	Unverified	N	$ -		Y	Y	Y		Avail	Avail	Avail	Avail	Avail
Mendocino	Y	Shapefile	33	100%			Annual		100	Unverified	N	$ 22	$ 430	N	Y	Y		$ -	$ -	$ -	$ -	$ -
Merced	Y	Shapefile	5	Urban	40ft	Rural	1 Month	2 Month	100	90%	Y	$ 1,000	$ 500	Y	Y	Y		$ -	$ -	$ -	$ -	$ -
Modoc	N	AutoCAD	5	Urban	10ft	Rural				No GIS		$ -	$ 350	Y	Y	Y						
Mono	Y	Shapefile	20	Urban	50ft	Rural	1 Month	Monthly	100	Unverified	N	$ -	$ 450	Y	N	Y		Avail	Avail	Avail		Avail
Monterey	Y	Shapefile	1	Urban	100ft	Rural	1 Month	Monthly	100	99%	N	$ -		Y	N	N		Avail	Avail	Avail		
Napa	Y	SDE	2	Urban	200ft	Rural	3 Month	As-Needed	100	100%	Y	$ -	$ 25	N	Y	Y		$ -	$ -	$ -	$ -	$ -
Nevada	Y	GDB	1	Varies	300ft	Varies	2 Week	Monthly	100	Unverified	Y	$ 3,000	$ 2,000	Y	Y	N	No	$ 25	$ 25	$ 400	$ 25	$ 750
Orange	Y	Intergraph	1	Urban	15ft	Rural	1 Month	Monthly	100	Unverified**	Y	$ 15,995		Y	Y	N	Avail	Avail	Avail	Avail	Avail	Avail
Placer	Y	AutoCAD							100	92%		$ 90	$ 1,000	Y	Y	Y						
Plumas	Y	Shapefile	High	50%	Low	50%	1 Month	Daily	100	93%	N	$ -	$ 300	Y	N	N		Avail			Avail	Avail
Riverside	Y	Shapefile	10	100%					100	99%	Y	$ 13,000	$ 205	Y	Y	Y		Avail	Avail	Avail	Avail	Avail
Sacramento	Y	Coverage	5	Varies	10ft	Varies	1 Month	Monthly	100	99%	N	$ 250	$ -	Y	Y	Y		$ -	$ -	$ -	$ -	$ -
San Benito	N	Hardcopy							0	No GIS	N	$ -	$ -	Y	Y	Y						

Table 6 Detailed Parcel Findings

County	GIS Basemap Available	Native GIS Format	Estimated High Positional Accuracy	Nature or Percentage of High Accuracy	Estimated Low Positional Accuracy	Nature or Percentage of Low Accuracy	Level of GIS Currency	Update Frequency	Percent of Mapping Completed	GIS Parcel Match Rate to APN*	Existing Data Use Agreement	GIS Parcel Cost	Assessor Roll Data Cost	Ownership Updates Available Monthly	Assessor Page Images Available Monthly	Assessor Page Updates Available Monthly	Building Outline Price	City and County Boundary Price	Flood Zone Price	General Plan Price	Township Range Price	Zoning Price
San Bernardino	Y	Coverage	2	25%	200ft	40%	1 Month	Daily	65	Unverified	N	$ 230	$ 840	N	Y	Y		$ -	$ -	$ -	$ -	$ -
San Diego	Y	Shapefile	10	Urban	100ft	Rural	1 Month	Daily	100	91%	Y	$ 14,546	$ 18,000		Y	Y		$ 25	$ 100	$ -	$ 25	$ 100
San Francisco	Y	SDE	2	100%			1 Month	Bi-Weekly	100	Unverified	Y	$ -	$ 25,000	N	Y	N		$ -				$ -
San Joaquin	Y	Coverage	3	Urban	50ft	Rural	Quarterly	Monthly	100	94%	Y	$ 200					No	$ 200	No	$ 200	$ 200	$ 200
San Luis Obispo	Y	Shapefile	Low	100%			Annual	Quarterly	100	Unverified	Y	$ -	$ 1,400	N	Y	Y		Avail	Avail	Avail	Avail	Avail
San Mateo	Y	Intergraph	5	Urban	15ft	Rural	1 Month	Daily	100	99%	Y	$ 100	$ 300	Y	Y	Y		$ -		$ -		
Santa Barbara	Y	Coverage							100	95%		$ 300				Y	Avail	Avail	Avail	Avail	Avail	Avail
Santa Clara	Y	Shapefile	5	Urban	50ft	Rural	Semi-Annual	Daily	100	97%	N							Avail	Avail	Avail	Avail	Avail
Santa Cruz	Y	Coverage	5	Urban	50ft	Rural	2 Month	Monthly	100	94%	Y	$ -	$ 300	N	Y	Y		$ 64	$ 64	$ 64	$ 64	$ 64
Shasta	Y	AutoCAD	High	Urban	Variable	Rural	1 Month	2 Month		Unverified	N	$ -	$ 480	Y	Y	Y		Avail			Avail	Avail
Sierra	Y	Shapefile					Annual		75	Unverified	N	$ -	$ 650	N	Y	Y		Avail				
Siskiyou	Y	Coverage	5	Urban	Over 5m	Rural	1 Month	Weekly	100	92%	Y	$ -			Y	Y	Y		Avail	Avail	Avail	Avail	
Solano	N	AutoCAD								No GIS			$ 1,078	Y							
Sonoma	Y	Coverage	5	10%	50ft	50%			100	98%		$ -						Avail	Avail	Avail	Avail	Avail	Avail
Stanislaus	Y	Shapefile	High	Urban	Low	Rural	1 Month	Weekly	100	97%		$ -	$ -	Y	Y	Y		Avail	Avail	Avail	Avail	Avail
Sutter	Y	Shapefile	40	100%			1 Month	Daily	100	Unverified	N	$ -	$ 600	Y	N	N		$ -	$ -	$ -	$ -	$ -
Tehama	Y	Shapefile	Low	100%					55	94%	N	$ -	$ 500	N	Y	Y		$ -	$ -		$ -	$ -
Trinity	Y	Shapefile	100	100%			Annual	Quarterly	100	Unverified	N	$ -	$ 600	Y	Y	Y		Avail			Avail	
Tulare	Y	Shapefile					1 Month	Weekly	100	94%	N	$ -	$ -	N	Y	Y		$ -	$ -	$ -	$ -	$ -
Tuolumne	Y	Coverage	Planning	100%			1 Month	Quarterly	100	96%	N	$ -	$.05/Parcel	Y	Y	Y		Avail	Avail	Avail	Avail	Avail
Ventura	Y	Shapefile	3	Urban	Lower	Rural	Quarterly	Daily	100	95%	Y	$ 3,000	$ 13,500	Y	Y	Y		Avail	Avail	Avail	Avail	Avail
Yolo	Y	Coverage	5	Urban	10ft	Rural	Annual	Quarterly	100	96%	N	$ -	$ 500	N	Y	Y		$ -	$ -		$ -	$ -
Yuba	Y	Shapefile	3m	95%	5m	5%	Semi-Annual	Semi-Annual	100	92%	N	$ 35	$ 250	Y	Y	Y		Avail	Avail		Avail	

Note:

* Represents an interpretive assessment of the GIS data quality. No value is assigned to counties with no GIS or those who did not verify/submit GIS information.

** These counties maintain high quality (considered 99% and above match rate) and comprehensive GIS basemap; actual match rates are not available due to sampling inconsistencies

Appendix D: State DLRI Programs

States throughout the nation are in the process of developing DLRI programs to serve different priorities and purposes. Although many of the programs have common themes, a significant variability exists in the program missions, structure, participants and level of development. Web links are provided for reference to gain a better perspective of these state's programs and the services provided.

Alaska

Advocacy and Coordination	Joint effort under the auspices of the Bureau of Land Management (BLM) and the Alaska Department of Natural Resources to create and maintain a statewide cadastral information system website. Limited State leadership
Data Development and Maintenance	Focus on images of land records documents
Data Aggregation	Consolidated repository of land record document images
Data Provider	Provides online access to scanned assessor maps through a GIS based web browser application.
Funding	By participating agencies
Links	http://www.dnr.state.ak.us/cgi-bin/lris/landrecords

Idaho

Advocacy and Coordination	Developed and maintained by the Idaho Department of Lands (IDL); State is now developing digital land records system to replace the current application
Data Development and Maintenance	Mylar plats scanned and indexed
Data Aggregation	
Data Provider	Provides online access to scanned assessor maps through a GIS based web browser application.
Funding	
Links	http://gis.idl.state.id.us/GIShtm/static/LandRec.htm

Minnesota

Advocacy and Coordination	Developed local government guide for developing parcel-based GIS.
Data Development and Maintenance	
Data Aggregation	
Data Provider	
Funding	GIS implementation plan recognizes significant funding challenges from the State with many funding initiatives falling short.
Links	http://www.gis.state.mn.us/iisac/gisindex.html

Montana

Advocacy and Coordination	All 56 counties have parcels converted in GIS format. A key characteristic of their success has been leadership and coordination from the State level.
Data Development and Maintenance	
Data Aggregation	
Data Provider	Access to online scanned assessor maps and GIS parcels is through a GIS based web browser application. Parcel data may be viewed and downloaded.
Funding	Implemented Montana Land Information Act that receives $1.00 per recorded map sheet. 25% of funds are allocated directly to local government, the remaining 75% leverages federal grants. The state distributed much of the 75% to local governments as assistance grants.
Links	http://gis.doa.state.mt.us

Nebraska

Advocacy and Coordination	Developed Land Information Program Strategic Plan and Nebraska Guidebook for <u>a Local Government Multipurpose Land Information System</u> to aid local governments in developing new data in a consistent manner.
Data Development and Maintenance	
Data Aggregation	
Data Provider	
Funding	Proposed State funding approach recommends incentive funding and cost sharing.
Links	http://www.calmit.unl.edu/gis/LRM_Index-Page.htm

New Jersey

Advocacy and Coordination	New initiative driven by legislature and governor to provide a web-based assessor management system integrated with GIS for the entire State.
Data Development and Maintenance	
Data Aggregation	State established regional data centers serving as property tax information aggregation points.
Data Provider	
Funding	
Links	

New Mexico

Advocacy and Coordination	Initiative to legislate parcel GIS had problems due to the vague definition of digital maps. Implemented digital map submission requirement.
Data Development and Maintenance	
Data Aggregation	
Data Provider	
Funding	
Links	

Maryland

Advocacy and Coordination	State responsible for property mapping statewide
Data Development and Maintenance	Images of assessor maps and parcel points developed, linked with assessor data
Data Aggregation	
Data Provider	CD of data distributed to 230 subscribers
Funding	Subscription fee for use of data
Links	http://www.mdp.state.md.us/data/mdview.htm.

New York

Advocacy and Coordination	Established a statewide data sharing cooperative by State policy; strives to improve efficiency through data sharing. The State's data sharing initiative has more that 450 participants including 51 of the 60 counties.
Data Development and Maintenance	Have built a parcel centroid layer for the state that can link with property attributes from assessors
Data Aggregation	
Data Provider	A cadastral clearinghouse for GIS parcels and statewide tax data is available.
Funding	The State has been successful in securing GIS development grants from the Centers for Disease Control.

Links	http://www.nysgis.state.ny.us/repository/Cadastral.htm

North Carolina

Advocacy and Coordination	The State conducts a periodic survey of counties to assess GIS and land records implementation status. A state GIS coordinating council has 32 members including 10 from local government; with 100 counties, 92 with GIS, 80 with parcels.
Data Development and Maintenance	
Data Aggregation	
Data Provider	Of the 80 counties with parcels, 50 have online map viewers. Thus, for a business to evaluate sites for a new facility, 50 websites would have to be queried. The State is implementing the NC One Map program that includes central access to parcel information.
Funding	
Links	http://www.gis.state.ga.us/Coordination/GISCC/Framework_Management/cadastdocs.htm

Oregon

Advocacy and Coordination	The ORMAP program is the most advanced DLRI related state program developing statewide representation of scanned assessor maps, tabular assessor attribute data and GIS parcels. As a result, statewide standards are being complied with by the counties.
Data Development and Maintenance	
Data Aggregation	
Data Provider	
Funding	Oregon has legislation funding the parcel program through a document recording fee and has implemented a State managed grant program to help fund county parcel programs.
Links	http://www.gis.state.or.us/data/ormap/statemap.htm

Tennessee

Advocacy and Coordination	Implementing a statewide base mapping program that will convert all paper maps to a digitized format. GIS-based parcel maintenance software is provided to each participating county; has published mapping specifications and a statewide business plan.
Data Development and Maintenance	
Data Aggregation	
Data Provider	
Funding	Participation by counties in the digitization program requires 25% county funding match to the State's 75%. Their business plan discusses several options for cost recovery including county cost share, federal funding, private partnerships and the sale of GIS data. Projected state costs (includes orthophotos in addition to parcels) are $19M to $28M with $26M to $35M from other funding sources. Cost benefit ratios for base mapping are stated in a range of 3:1 up to 20:1, however, 2:1 benefit to cost ratio is assumed for the State.
Links	http://gis.state.tn.us/mapping.html

Utah

Advocacy and Coordination	Developing GIS layers for shared tax district boundaries. State coordinating with Counties to develop statewide initiative
Data Development and Maintenance	Counties are at different points of development of digital parcel data and no consistent standards are applied.
Data Aggregation	
Data Provider	
Funding	The State established a limited funding program for cadastral development in rural counties in 2001.
Links	http://agrc.its.state.ut.us/agrc_giscoordination/coordinationintro.html

Washington

Advocacy and Coordination	State cadastral data standards have been adopted. The Cadastral Framework Project has been in place since 1997 and is an intergovernmental collaborative striving to improve cadastral data throughout the state.
Data Development and Maintenance	
Data Aggregation	
Data Provider	Washington Geographic Information Council has a web-based GIS viewer for accessing parcel information.
Funding	
Links	http://wagic.wa.gov/Framework/cadastre/Default.htm

Wisconsin

Advocacy and Coordination	Formed a Land Information Program that administers a grant program to local governments to improve land records data including developing DLRI consistent with state standards. The State has developed parcel numbering standards, serves as a clearinghouse for relevant county mapping information. The Program requires participating counties to submit business plans for land records improvements.
Data Development and Maintenance	
Data Aggregation	
Data Provider	
Funding	
Links	http://www.doa.state.wi.us/section_detail.asp?linkcatid=216

Appendix E: Federal DLRI Programs

The federal government has several significant programs that directly support, enable, or relate to the California DLRI needs and concepts within this report. Some of the federal programs are highlighted briefly.

National Spatial Data Infrastructure (NSDI)

A federal program initiated in 1994 by executive order to address the problem of redundancy, incompatibility and reduce the cost of geographic information from a national perspective. It established a vision for national multilevel governmental coordination for managing digital geographic information.
http://www.fgdc.gov/nsdi/nsdi.html

USGS National Map

A database providing public domain core geographic data about the United States that other agencies can extend, enhance and reference as they concentrate on maintaining other data that are unique to their needs. The National Map presents a vision, core strategies and an architecture the can be used by California to address its needs. http://nationalmap.usgs.gov/

Recent efforts in building the National Map have included pilot projects including the Lake Tahoe area. Current activities are addressing the compilation of The National Map data supporting homeland security initiatives including essential data sets. Although cadastral/parcel data is not one of the National Map framework themes, DLRI definitely has value for homeland security uses and could be incorporated at a later time.

The Resources Agency, USGS, NASA, and OES have a Memorandum of Understanding (effective 12/2002) addressing joint development efforts for the California implementation of the National Map.

Geospatial One Stop

A federal geospatial portal www.geodata.gov is a web-based portal for one-stop access to maps, data and other geospatial services that will simplify the ability of all levels of government and citizens to find geospatial data and learn more about geospatial projects underway.

An intergovernmental board of directors composed of state, local, tribal and federal representatives governs the Geospatial One-Stop initiative. This intergovernmental board helps provide guidance on the direction of the project and ensures dialogue among the levels of government making major investments in geospatial information. Based on the substantial investment of state and local governments in the collection and management of geospatial data, formation of an intergovernmental board is intended to facilitate the ability of governments to leverage their individual resources to be more efficient, more cost effective and better serve their citizens.
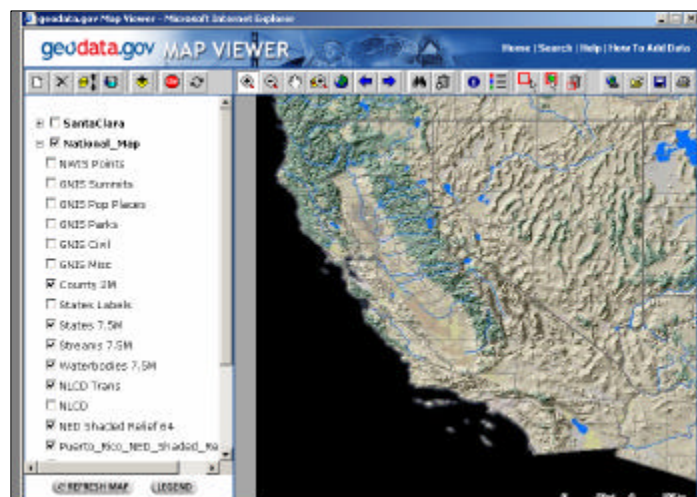
The Map Viewer shown above allows multiple agencies' data to be displayed together on a map by linking selected web map servers through the portal.

BLM Land Survey Information System

The Land Survey Information System or LSIS is the official government web site for the distribution of the Public Land Survey System (PLSS) of the United States. The Bureau of Land Management (BLM) cadastral survey program is responsible for the official boundary surveys for all federal agencies in the U.S. that together manage over 700 million acres. The site provides map viewing of survey information availability and supports direct access to survey information for downloading. BLM PLSS data should be integrated within the California DLRI program. http://www.lsi.blm.gov/help/help_index.htm
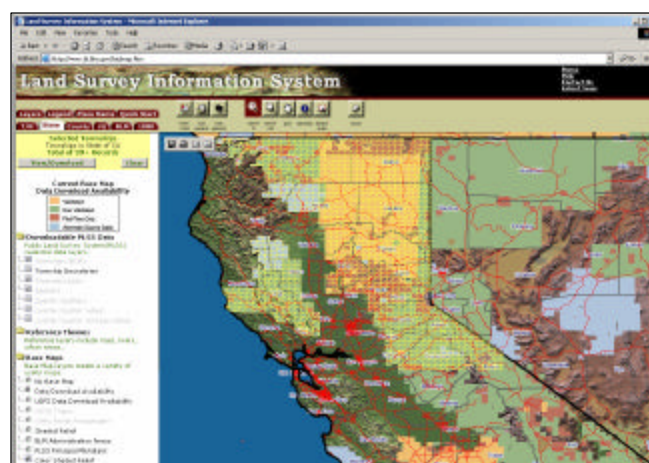
National Integrated Land System (NILS)

The National Integrated Land System (NILS) is a joint project between the BLM and the USDA Forest Service in partnership with the states, counties and private industry to provide business solutions for the management of cadastral records and land parcel information in a Geographic Information System (GIS) environment. This ambitious project is still in its development phase.

An Assessment of Parcel Data in the United States, FGDC Cadastral Subcommittee, March 2003

The success of developing a national parcel database is dependent upon the ability of local governments to annually provide parcel core data to an area integrator for compilation into a multi-jurisdictional database. Thirty-four states fully responded to the survey requesting the status of digital parcel mapping in their state. For these thirty-four, 61% of the parcels are available digitally and 13 states had more than 70% available.

Appendix F: Study Participants

Representatives from the following agencies were interviewed or participated in one of several surveys to determine DLRI needs and benefits. This includes 20 state agencies with 45 programs plus two federal agencies. The objective of the interviews was to gauge the need, diversity of need and types of benefits anticipated from commonly accessible Digital Land Record Information.

California Air Resources Board

PTSD, Emission Inventory Program	Beth Schwehr Todd Sax
SDD, Toxic Air Contaminant Program	Michelle Houghton
RD, Health Effects Research Program	Cynthia Garcia

California Department of Conservation

Farmland Mapping and Monitoring	J. Santill

California Department of Fish and Game

Lands and Facilities Branch	Craig Turner
Information Services Branch, Wildlife Mgmt.	Linda Miller
Habitat Conservation	• Tracy Love
Region 3 Wildlife Management	Jeannine DeWald
San Joaquin Valley / S. Sierra Region	Jeffrey R. Single
• Fresno	• Paul Brandy

California Department of Forestry and Fire Protection

Southern Region Office – Forest Practice GIS	Jolia Koo
State Forests	Sebastian Roberts
Fire and Resource Assessment Program	Chris Keithley Robin Marose
North Coast Watershed Assessment Program, Fire and Resource Assessment Program	Fay Yee Russ Henly
Technical Services Section, Lands Unit	• Marc R. Van Zuuk
Nevada-Yuba-Placer Unit	• Sean Griffis

California Department of Health Services

Environmental Health Investigations Branch	Andrew Hertz

California Department of Housing and Community Development

Housing Policy Division	Paul Dirksen Jr.

California Department of Pesticide Regulation

Information Technology Division	Dean Chiang Rosemary Neal

California Department of Transportation

Right of Way Division	Greg Lundblad
Right of Way Division	Pete Psander
Right of Way Engineering	John Grisafi
Office of GIS	Roger Ewers
GIS Services	Rick Sperling
GIS Services	Karen Kokoich
Survey	Mark Wyatt

California Department of Water Resources

Environmental Services	Harry Spanglet
• Delta Levees	Joel Dudas
Statewide Planning	Greg Smith

California Governor's Office of Emergency Services

Hazard Mitigation Program	Randy Fortner
Hazard Mitigation Program	David Kehrlein

California Highway Patrol

• Info Management Division – Network Management Section	Ray Patron

California Resources Agency

Legacy Project	Mike Byrne
Office of Mine Reclamation, Abandoned Mine Lands	Sam Hayashi

California State Board of Equalization

Tax Rate Area Mapping	Ralph Davis

California State Coastal Conservancy

	Jamie Schmidt

California State Lands Commission

Boundary Unit	Kelly Olin
Compliance Program	Tim Lipscomb
School Lands	Bruce Crandall Donald B. Fruechtl, MAI
Title	Jeff Kato
Mineral Resources Management Division	Greg Pelka

Central Coast Regional Water Quality Control Board

TMDLs	Mark Angelo

Central Valley Regional Water Quality Control Board

San Joaquin TMDL Program | Diane Beaulaurien
Bob Matteali

Lahontan Regional Water Quality Control Board

South Lake Tahoe office | Anne Sutherland

North Coast Regional Water Quality Control Board

| | Rebecca Fitzgerald |
| Cleanups & Special Investigations Unit | Stephen Bargsten |

University of California Davis

Information Center for the Environment | Dave Shpak
Mike Byrne

U.S. Department of Agriculture

Natural Resources Conservation Service | Susan Southard

U.S. Fish and Wildlife Service

Ecological Services | Tony McKinney

Appendix G: Implementation Cost Detail

	Option 2		Option 3		Option 4		Option 5	
	Initial	Ongoing	Initial	Ongoing	Initial	Ongoing	Initial	Ongoing
Advocacy and Coordination								
Coordinate with Counties to obtain existing data	$ 4,160							
State coordinates with counties to develop partnerships			$ 20,800	$ 3,120				
Adopt minimum content and format standards	$ 4,000							
Develop comprehensive standards and guidelines[8]			$ 80,000		$ 80,000		$ 80,000	
Document GIS development procedures			$ 60,000		$ 60,000		$ 60,000	
Program promotion, outreach, education[9]			$ 20,400	$ 6,000	$ 20,400		$ 20,400	
CMCC coordinates sharing of collected data within State								
Full time technical manager					$ 110,000	$ 110,000	$ 110,000	$ 110,000
Private sector coordinates with counties for data collection							no direct cost	
SUBTOTAL	**$ 8,160**	**$ -**	**$ 181,200**	**$ 9,120**	**$ 270,400**	**$ 110,000**	**$ 270,400**	**$ 110,000**
Data Development and Maintenance								
One time seed funding to counties			$ 1,450,000					
County development partnership								
Coordinate edmatch of new data			$ 5,000					
Edgematch all data					$ 241,280		$ 241,280	
Partnership with counties to enhance existing data [10]					$9,000,000		$9,000,000	
Scan all assessor maps[11]					$ 150,000		$ 150,000	
Counties maintain data to state standard								
SUBTOTAL	**$ -**	**$ -**	**$ 1,455,000**	**$ -**	**$9,391,280**	**$ -**	**$9,391,280**	**$ -**

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[8] Costs address workshop administration and key technical lead. Other participant costs not included.
[9] Labor plus expenses or travel, supplies, conferences
[10] Fund missing parcel conversion and enhance existing parcels, $10 for new parcels
[11] $0.50 per sheet

	Option 2		Option 3		Option 4		Option 5	
	Initial	Ongoing	Initial	Ongoing	Initial	Ongoing	Initial	Ongoing
Data Aggregation								
Acquire Existing DLRI data (Labor)	$ 14,560	$ 14,560	$ 14,560	$ 14,560				
GIS Parcels	$100,000 [12]	$ 100,000	$300,000 [13]	$ 300,000				
Assessor Maps								
Assessor Roll file	$ 100,000		$ 100,000					
Standardize data to match standards								
GIS Parcels	$ 4,160	$ 4,160	$ 4,160	$ 4,160				
Assessor Maps								
Assessor Roll file	$ 40,000		$ 40,000					
Aggregate standardized county control and jurisdictions					$ 25,000	$ 15,000	$ 25,000	$ 15,000
Monthly updating					$ 50,000	$ 9,984	$ 50,000	$ 9,984
SUBTOTAL	**$ 258,720**	**$ 118,720**	**$ 458,720**	**$ 318,720**	**$ 75,000**	**$ 24,984**	**$ 75,000**	**$ 24,984**
Data Provision								
Load onto existing server	$ 3,120	$ 3,120	$ 3,120	$ 3,120				
Manage access permissions	$ 3,120	$ 3,120	$ 3,120	$ 3,120				
Deploy Internet DLRI portal					$ 500,000	$ 200,000	$ 50,000	$ 150,000
Web services integrate other DLRI providers					$ 300,000	$ 60,000		
Links to county web sites					$ 4,160			
SUBTOTAL	**$ 6,240**	**$ 6,240**	**$ 6,240**	**$ 6,240**	**$ 804,160**	**$ 260,000**	**$ 50,000**	**$ 150,000**
TOTAL	**$ 273,120**	**$ 124,960**	**$2,101,160**	**$ 334,080**	**$10,540,840**	**$ 394,984**	**$9,786,680**	**$ 284,984**
Local Funds[14]	0%		69%		89%		96%	

[12] Cost to acquire existing parcels from low cost counties
[13] Assumes reduced cost from high cost counties
[14] Percentage of data development and maintenance costs. Performed by counties, supported through statewide funding strategy.